# The Chemical Age

**A Weekly Journal Devoted to Industrial and Engineering Chemistry**

VOL. XII. No. 290 JANUARY 3, 1925 Prepaid Annual Subscription: United Kingdom, £1.1.0; Abroad, £1.6.0.

## Contents



*NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.*

*The prepaid subscription to* THE CHEMICAL AGE *is 21s. per annum for the United Kingdom, and 26s. abroad. Cheques, Money Orders and Postal Orders should be made payable to Benn Brothers, Ltd.*

*Editorial and General Offices*—8, *Bouverie St., London, E.C.4.*
Telegrams: "Allangas, Fleet, London." Telephone: City 9852 (6 lines)



## An Important British Discovery

IN the history of the application of artificial colouring matters to vegetable and animal fibres certain discoveries stand out boldly and may be regarded as pegs upon which the whole fabric of the dyeing industry hangs. First came the discovery of Magenta and the range of basic dyes of the safranine type, dyeing cotton with the help of a tannin mordant. Then followed the invention of azo and triphenylmethane colours for wool or mordanted cotton, primuline, and the "ingrain" colours for cotton, and the direct benzidine colours. Next the long and expensive indigo researches matured brilliantly in the various indigo and thioindigo syntheses. The beginning of the twentieth century saw the placing upon the market of the first of the valuable anthraquinone vat colours, and in quite recent years completely satisfactory methods for the dyeing of acetate silk have been evolved. Most of these outstanding discoveries were the outcome of long and painstaking research, in which British chemists showed themselves equal to and in many instances superior to their foreign rivals. Each discovery was the basis for years of development work no less important from the commercial point of view, and here until recently, for reasons which have many times been discussed and which we firmly believe no longer obtain, the Germans far outdistanced us.

We are able in this issue to give the first account of a discovery which may prove to be yet another main "peg" upon which to hang extensive developments of the dyestuffs industry. The anthraquinone series comprises some of the fastest and most beautiful colours known, but so far they have found little application to wool on account of their almost complete insolubility, while for cotton the special process of "vatting" is necessary. Sulphonation, the method used for solubilising other types of dyestuffs, was only effective for the simplest members of this series, and the solubility which made them suitable for wool destroyed their usefulness as direct dyes for cotton. The problem of devising a series of anthraquinone compounds which would dye wool and cotton equally well was an extremely difficult one, and has been attacked by both British and foreign chemists at various times during the twenty years which have elapsed since anthraquinone vat dyestuffs were introduced. It is gratifying, therefore, to be able to record its solution (in a double sense) by British chemists, and our congratulations are offered to the Morton Sundour Fabrics, Ltd., and Scottish Dyes, Ltd., on the successful issue of their researches. It is not, of course, to be expected that the new "Soledon" colours will compete with the cheap azo acid colours, but for the better class dyeing of both wool and cotton (and presumably of mixtures) they offer exceptional advantages and are sure of a warm welcome by the trade.

## Sulphur as a Fertiliser

WE have received from Dr. H. Clay Lint, of the Texas Gulf Sulphur Co., 41, East Forty-Second Street, New York, an interesting communication respecting an editorial note on "Sulphur as a Fertiliser" (THE CHEMICAL AGE, December 6, p. 570), in which reference was made to a brief report on the subject that Dr. Lint prepared for the *American Fertiliser*. From the wording, he points out, it might be inferred that the recommendations of 275 to 450 lb. per acre as the proper amount of sulphur to be applied were in contrast to those of Dr. Fletcher, of the U.S. Bureau of Mines. The rates mentioned were taken from the reports of

French work recently published, and are not, in Dr. Lint's words, "specifically adapted to this country."

"As you may know," Dr. Lint continues, "the Texas Gulf Sulphur Company has for the past three years co-operated with a number of agricultural agencies in this country, and has also established a number of research fellowships dealing with various phases of the agricultural uses of sulphur. Possibly the most fair statement on the amounts of sulphur necessary to accomplish certain ends on the American soils would be as follows:—

"For stimulating the growth of alfalfa in some of the Pacific Coast States, where such remarkable results have been obtained, it has been found that about 50 lb. per acre per annum is the most economical application. This is usually applied broadcast in the fall; but since it is quite difficult to make such small applications, what they actually do is to apply about 150 lb. per acre, and allow that to suffice for three years.

"For the control of Irish potato scab, which is quite prevalent in the Atlantic Coast States, applications will vary from 300 to 600 lb. per acre, depending upon the reaction of the soil and the prevalence of scab. In other words, the sweeter the soil the more sulphur would be required, and even in cases where theoretically it would require more than 600 lb. it has been found advisable to extend the total application over two or three years, rather than try to make it all at once. In some instances where heavy applications of lime have been made in times past it has required as much as 1,800 lb. of sulphur per acre completely to eliminate the scab, and actually to do this has required three to four years.

"With the sweet potato an entirely different condition exists. Sweet potatoes are quite tolerant to acidity and it is practically impossible to obtain injurious effects on this crop. On the other hand, there seems to be no necessity for making an application larger than 350 lb. per acre. A peculiar feature of this crop also is that equally as good results are obtained where the sulphur is mixed with the fertiliser as where it is broadcast, a condition which is not true in the case of the Irish potato.

"A considerable amount of research has been done on the possible stimulating action of the sulphur included in the regular chemical fertilisers. Very remarkable results have been obtained with some vegetable crops, and earlier maturity and increased yields have been obtained quite frequently. While no results have been published, and we are, therefore, unable to quote definitely, it is possible to state that relatively small amounts seem to be equally as efficient as the larger ones. It is quite probable that from 50 to 100 lb. per ton will be found most satisfactory.

"I trust," he concludes, "that these points are of interest to you." They are, and we are obliged to Dr. Lint for his communication.

## Disintegrating in Inert Atmospheres

THAT mishaps (many of them probably of a trivial nature but none the less aggravating) during the process of grinding and pulverising certain materials are more common than is generally supposed may be gathered from the inquiries we have from time to time had submitted to us in connection with any safety measures that may be adopted. The risk of fire and explosion has, of course, been greatly reduced during recent years by the introduction of preventive measures based upon the results of systematic investigation of the principles underlying the ignition and combustion of different dusts. The introduction of electric light has greatly reduced the chance of ignition by an open flame, and in many cases inflammable materials are ground and conveyed in an inert atmosphere. The inflammability of a given dust is diminished when the percentage of oxygen in the air in which the dust is suspended is reduced, and one suggestion is that ignition can readily be prevented by diluting the air with flue gases. The majority of our inquiries have related to the disintegration of sulphur, a substance which is peculiar owing to the fact that a dust cloud containing 7 milligrams per litre allows of ready flame propagation from particle to particle even though the heat of combustion is relatively small.

We notice that some important work has just been carried out in connection with sulphur by Mr. H. W. Frevert, of the U.S. Bureau of Chemistry, who has determined the effect of utilising inert atmospheres of oxygen, carbon dioxide, and nitrogen containing successively decreasing proportions of oxygen. Sulphur explosion tests were conducted with a proportion of oxygen ranging from 15·8 to 0·8 per cent., and while no flame could be observed definitely in mixtures containing less than 9·5 per cent., Mr. Frevert states that the safe limit in percentage of oxygen in a sulphur mixture may be taken as 8·5 per cent., the dilution of oxygen which is necessary being independent of the concentration of sulphur. Where conditions permit it would seem, therefore, that the provision of an inert atmosphere is probably the most effective manner of dealing with the problems met with in the treatment of sulphur, and to those who are anxious to follow out the matter in detail we can recommend a study of the volume on *The Dust Hazard in Industry* which Dr. W. E. Gibbs has written for the Chemical Engineering Library, and in which all the latest available information in connection with the cause and prevention of these explosions will be found.

## The Fertiliser Position in India

IN the recent report of the Indian Tariff Board, the small use hitherto made of artificial manures in India is deprecated; indeed, it is frankly stated that this circumstance is "a reproach to Indian agriculture." It should be remembered, however, that artificial fertilisers, which are peculiarly suited to this country, are not necessarily satisfactory for India. The quality of the soil and the climatic conditions are not identical in the two countries. Our agriculturists are not confronted with monsoon rainfalls. The dissolution of soluble fertilisers and their percolation outside the zone of active influence are the definite problems with which Indian cultivators are faced. For this reason, readily soluble fertilisers must be applied with care and with a proper course of action.

Sir A. D. Hall, late director of the Rothamsted Experimental Station, indicated that in the practice of farming, "the proper course of action is never anything more than a judicious compromise adapted to all the various conditions of climate, soil, and markets." So far as certain parts of India are concerned, the proper course of action may conceivably be to use dissolved bones—a quality of bone superphosphate which contains 2½ to 3 per cent. of nitrogen and 15 per cent. of phosphoric acid, rather than to employ a compound manure constituted of calcium superphosphate and sulphate of ammonia. It is known that works have recently been erected in India for the production of bone superphosphate from jungle bones. As the chemical company in question is a native one, presumably they are cognisant of the characteristics

of the fertiliser best adapted to Indian soil and climatic conditions in this particular area. There is, however, reason to know that in many parts of India sulphate of ammonia can be advantageously used.

## The Need for Propaganda

IRRESPECTIVE of the point of view of the most suitable fertiliser to be applied in specific areas or provinces in India, there is an inherent prejudice to be overcome. The Indian cultivator is not disposed to use artificial manures unless their advantages can be ocularly demonstrated. This means that much propaganda work of an educational character must be undertaken. There is no one better qualified to carry out such work or to make the necessary demonstrations in Western India than Mr. A. D. Modak, of Bombay, whose knowledge of Indian agricultural conditions is unique and it is gratifying to know that this gentleman has been retained by the British Sulphate of Ammonia Federation to develop the use and extend the application of sulphate of ammonia. In the planting districts of India, beneficial effects accruing from the systematic use of chemical manures to such products as tea, coffee, and rubber are known. The need for phosphatic fertilisers for the indigo crop is realised, and the value of the application of sulphate of ammonia in increasing crops, such as sugar, cane, and cotton, is now appreciated. But this knowledge must permeate the masses of small cultivators, who are the potential users of fertilisers. It is not enough for a few chemists or students of agricultural colleges, whether English or native, to know these facts. They must be disseminated throughout the country and become common knowledge. When this is done, and when the number of agricultural banks and co-operative societies grows, then it is certain that there will be an appreciable increase in the demand for fertilisers in India. Meanwhile, it will be well not to underrate the difficulties of the task or to anticipate immediate issues. Two or three years must elapse before tangible results can possible be forthcoming.

## Dr. Downing Liveing

THE death of Dr. George Downing Liveing, Professor of Chemistry at Cambridge, and President of St. John's College, at the age of 97, carries one back to the very beginnings of organised chemical studies at Cambridge, and supplies some measure of the very remarkable organisation which has been built up on those early foundations. Some sense of the great period covered by Dr. Liveing's active work is conveyed by the single fact that seventy-two years have passed since he started the first very primitive laboratory at Cambridge with two students! On the death in 1861 of James Cumming, who had been Professor of Chemistry for forty-six years, Liveing, who had already served as deputy-professor during Cumming's last illness, was elected to succeed him. In 1863 the University began the policy of building up a great group of science laboratories and museums, and with the opening of the first block in 1865 Liveing was able to announce a course of practical chemistry in the University laboratory. The election of Dewar in 1875 to the Jacksonian Professorship greatly strengthened the chemical departments, and shortly afterwards Liveing began his spectroscopic studies, the results of which, mainly published in conjunction with Dewar, "make up a record of patient, accurate, conscientious labour, and taken together constitute one of the most valuable contributions to this department of chemical physics yet made by British workers." This tribute by the Royal Society, when Liveing was awarded the Davy Medal in 1901, may well stand as an epitaph to this sincere student and servant of science.

## "Chemical Research"

UNDER this heading *The Times* gave prominence last week to an announcement that the President of the Council had appointed Professor G. T. Morgan, of Birmingham, to be superintendent of the new Chemical Research Laboratory of the Department of Scientific and Industrial Research at Teddington. A similar announcement has also reached us from more than one quarter. We are, however, still without any official confirmation of this interesting report.

## Points from Our News Pages

An important British dyestuffs discovery is recorded and explained (p. 4).

A review of the Dyestuffs Industry in 1924, by Col. Sir Edward A. Brotherton, Bt., appears on p. 5.

The Norwegian Fish Oil Industry is dealt with in an interesting article on p. 6.

Our London market report reflects the seasonal inactivity, but the general outlook is hopeful (p. 15).

Our Scottish market report shows considerable activity in the Heavy Chemical Market and indicates the possibilities of a general improvement (p. 18).

## The Calendar

| 1925 Jan. | | |
|---|---|---|
| 5 | Institution of the Rubber Industry (London Section): "Mechanical Structure of Rubber." A. Healey. 8 p.m. | Engineers' Club, Coventry Street, London. |
| 5 | Society of Chemical Industry (London): "An Early Chapter in the Benzol Industry." Wilfred Irwin. 8 p.m. | Burlington House, Piccadilly, London. |
| 6 | **West Yorkshire Metallurgical Society: "The Value of some Workshop and Laboratory Tests." 7.30 p.m.** | **George Hotel, Huddersfield.** |
| 6 | Hull Chemical and Engineering Society: "Lubrication." T. A. Nightscales. 7.45 p.m. | Grey Street, Park Street, Hull. |
| 6 | Institute of Metals (Birmingham Section): "Cobalt: Its Production and Some of Its Uses." T. H. Gant. 7 p.m. | Chamber of Commerce, New Street Birmingham. |
| 6 | Sir John Cass Metallurgical Society: "Works Costing." C. H. Richardson. | |
| 6 | Institution of Petroleum Technologists: "The Behaviour of Lubricating Oils under Oxidising Conditions." J. B. Hoblyn. 5.30 p.m. | Royal Society of Arts, John Street, London, W.C.2. |
| 9 | Institute of Metals (Sheffield Section): "Die Casting." A. H. Mundey. 7.30 p.m. | The University, St. George's Square, Sheffield. |
| 9 | Society of Chemical Industry (Manchester Section): "The Melting Point of Coal Ash." Part II. | 16, St. Mary's Parsonage, Manchester. |
| 9 | West Cumberland Society of Chemists and Engineers: "The Structure of Matter." E. H. Todd. 7 p.m. | Workington. |
| 10 | Institute of Metals (London Section): "Extensometers." R. H. Greaves, D.Sc. 7.30 p.m. | Institute of Marine Engineers, 85-88, The Minories, London, E.1. |

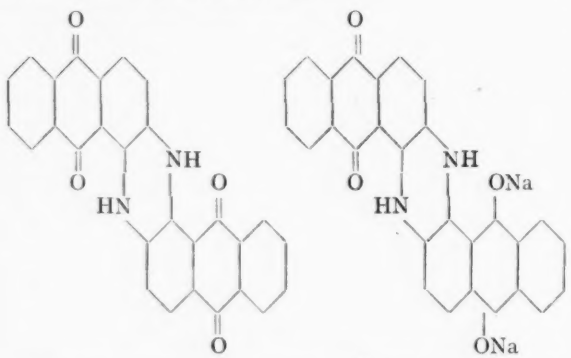
# New Developments in Anthraquinone Vat Dyestuffs

## By L. J. Hooley

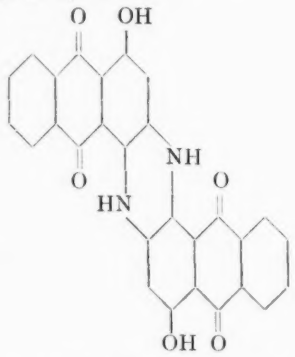
*In the following article a notable new development is described in the production of soluble Anthraquinone Vat Dyestuffs, the processes for which have been worked out in the laboratories of Morton Sundour Fabrics, Ltd., of Carlisle, and are to be applied on a large scale by Scottish Dyes, Ltd., to their well-known Caledon colours. This promises to be, perhaps, the most valuable discovery in the field since pre-war days, and should have far-reaching influence on the question of dye fastness generally.*

ONE of the most urgent and important of the problems that have been awaiting solution in the chemistry of dyestuffs is that of producing vat dyestuffs in a soluble form. The difficulty of application of this series of compounds has hampered their use since the discovery of Indanthrene by Bohn in 1901, but the announcement has now been made that Scottish Dyes are to issue the "Caledon" vat colours in such a form. That the problem has not been one admitting of easy solution is evident or it would have been solved before now. The difficulty, of course, is dependent on the chemical constitution of the dyes in question as well as on the properties necessary in the desired soluble bodies. It is hoped to give in this article a brief general idea of the relations between fastness, constitution, and application in these compounds in order to bring out the significance of the new developments, and it may be advisable to state here that the vat dyestuffs primarily under consideration are those of the anthraquinone series of which Indanthrene was the first example. This is the series in which both fastness and the disadvantages of insolubility are at their highest. Insolubility, while inconvenient in applying the dyestuff to the fibre, has very obvious merits once dyeing is finished, and it is important that the dyeing difficulty should not be solved at the expense of fastness, a result which might very easily happen.

The anthraquinone vat dyestuffs, as is well known, may be considered in terms of the classical colour theory to owe their colour properties to CO groups acting as chromophores. The dyestuffs themselves are practically insoluble, and except in a few instances of very minor technical importance have no affinity for textile fibres. On reduction with sodium hydrosulphite and soda, however, the carbonyl groups are converted first to the enolic form and then to the sodium salts, which are soluble. In Indanthrene, two out of the four carboxylic groups are so reduced, and this substance exists in the vat as the so-called leuco indanthrene




which is absorbed by cotton and on oxidation is reconverted to the original form. Although this is not a very elaborate procedure, the necessity for this method of solution and for maintaining the vats containing the unstable leuco compounds in condition for dyeing, with other attendant difficulties, has been seen to have the actual effect in practice of restricting their use to within much narrower limits than might have been expected. The necessity for the presence of alkali is responsible for a limitation of a different kind. To return to the solubility question, solution as carried out in vatting depends on the production of soluble ONa groups which are unfortunately unstable. In a substance such as Algole Blue 3G where hydroxyl groups are




already present, stable sodium compounds may be readily obtained, but they only render the molecule slightly soluble, and what is more important do not confer dyeing properties, being much less reactive than those formed from the —CO groups, and Algole Blue 3G has to be reduced in the same way as the others. In the simpler anthraquinone derivatives, that is, those which form the acid alizarine series, solubility is conferred by sulphonation either of the anthraquinone nucleus itself or of attached arylamino groups. If the attempt is made to treat the more complex derivatives in the same way the resulting solubility is very much less. Indanthrene Blue WB, a sulphonated indanthrene, is partially soluble in hot water and consequently finds a limited application to wool, but it has to be vatted before it will dye cotton, and this method of sulphonation has never been sufficiently valuable to extend to the other members. Other groups such as carboxylic acid groups and basic groups are much less effective than sulphonic acid groups and in fact valueless.

The failure of these normal solubility devices suggests the carbonyl groups as the most promising points of attack in the molecule, as it appears that only here have the otherwise inert molecules the necessary mobility.

Even if the desired compounds can be produced in this way, they require not only to be soluble but to be stable enough to be marketable. They must also dissolve in water without the aid of dissolving agents; they must have affinity for the fibre and be easily reconverted to the original substance with unimpaired fastness. Especially if they are to be used satisfactorily for animal fibres they must dissolve without alkalis. In the indigoid series, indigo itself has been converted to Indigosol by Bader and Sunder, of Messrs. Durand and Huguenin, who have elaborated a method by which sulphonic acid groups may be attached to the two carbonyl groups in the indigo molecule. The difficulties in the case of the indigo colours have always been less than with the anthraquinone series. With the former the fastness is not so great and the insolubility less. With indigo itself a strong alkaline vat is not necessary, and it has consequently always enjoyed an extended application for wool.

In addition, there have already been several partially successful solutions of the difficulty for this dyestuff, e.g., Kalle's Indigo Salt T, Indophor, Baeyer's ortho-nitro phenyl propiolic acid, etc. In the Helindone series there have also been vat dyes made specially for wool.

With the Indanthrene series, however, no such substances have hitherto been manufactured, and the announcement of Scottish Dyes products under the name of Soledon colours is therefore all the more noteworthy.

The first dyestuff to be marketed in this soluble form is the

well-known Caledon Jade Green of Scottish Dyes, Ltd., which now appears as Soledon Jade Green. The name is a combination of "Solway" and "Caledon," the firm's trade names for the acid alizarine series of wool colours and the anthraquinone vat colours manufactured by them, and thus denotes the universal applicability of the new products to animal and vegetable fibres.

The appearance of this dyestuff opens out most promising applications in the field of fast dyes, as well as the possibility of an enormously extended use. Caledon Jade Green is already known as a dyestuff which is unsurpassed for combined colour and fastness properties. In its new form it can be dyed directly without the addition of assistants, penetration is better than with the vat method of dyeing, and the development process is simple and straightforward. It can consequently be dyed on cotton and wool equally. The application to wool will make possible a great increase in the fastness of dyed woollen goods, as the general chemical properties of the anthraquinone compounds used for vat dyes are much superior in this respect to the corresponding compounds in the acid alizarine series, the pre-eminent one for wool. The method for converting anthraquinone derivatives into wool colours, e.g., by sulphonation, it has been seen, cannot be used for the large molecules such as indanthrene or flavanthrene, as the sulphonic acid group does not appear to be sufficiently powerful to make them properly soluble. As the acid alizarine dyestuffs usually contain only a single anthraquinone molecule, the addition of auxochromes is necessary for the development of colour, and for some of the deeper shades as many as six may be found.

In anthraquinone vat derivatives, the whole or the bulk of the colour depth is given by the complex ring structure, and the addition of auxochromes, which are often a source of weakness, is unnecessary. The new soluble green also shows corresponding advantages in the dyeing of silk, viscose silk, and linen.

A result of great importance is that with the direct method of working and the avoidance of the inconveniences attached to the vat method it becomes possible greatly to increase production with corresponding reduction in cost.

Apart from the advantages in dyeing and in the improvements to be expected in the general fastness of dyed textile materials it is gratifying, as the problem is so essentially an organic chemistry one, that the production on a commercial scale of the first soluble anthraquinone vat dye should have been achieved by the British dyestuff industry.

# Some Notes on Dyestuffs Progress in 1924

## By Col. Sir Edward A. Brotherton, Bt., LL.D.

In pre-war days the total capacity of the plants manufacturing dyestuffs was about 300,000,000 pounds, of which Germany possessed 75 per cent., being by far the largest producer. Switzerland, with about 7 per cent., came second, in order of importance, the remaining 18 per cent. being shared by Great Britain, the United States, France, Holland and Italy. The war, which induced so many profound changes, brought about no greater change in industry than in the manufacture of dyestuffs. The world's capacity has been doubled. Germany still possesses more than half and is now followed by the United States with about 20 per cent., Great Britain with about 10 per cent., Switzerland and France with about half the capacity of Great Britain, and Italy and Japan with 2 to 3 per cent. each. Each country aims at being self-supporting, and endeavours by safeguarding measures to foster the new industry; and those with capacities greater than the demand of the home market are endeavouring to obtain a share in the other markets of the world. It is probable that more dyestuffs are being consumed than in pre-war days; but the world's requirements are still much less than the present capacity for manufacture, and it is inevitable that some firms which have entered this business without resources sufficiently large to carry them over a period of fierce competition must sooner or later withdraw from the struggle.

Although the position in this country is not entirely reassuring, much has been accomplished. Great Britain now manufactures more than 80 per cent. of her requirements, and largely holds the trade of her overseas dominions; but it must not be overlooked that the industry is protected both at home and in some of the colonies, and it is a fair assumption that much of the trade would be lost if this protection were withdrawn. Great Britain cannot hope to build up in a decade the business which has taken Germany half a century to bring to its present condition; and it is doubtful whether her handicap can ever wholly be removed. It seems evident, therefore, that to preserve the dyestuffs industry it will be necessary to provide adequate safeguards after the present Dyestuffs Regulations Act has come to an end.

What is the touchstone of success in the Dyestuffs industry? It is Research. This simple fact cannot be stated too frequently. Dr. Levinstein, whose opinions on this subject merit the most careful consideration, wrote in 1923: ". . . Clearly the world's trade belongs to those who bring out the new products, not to those who copy them." The idea is not new. The world's thinkers have expressed the same thought many times and in many ways. Francis Bacon, early in the seventeenth century, said of Research that it was the "intelligence department of organised knowledge." A department of this character is essential to every dyestuffs concern which has hopes of future success, or possesses even the desire to exist. "Research," says Dr. Levinstein, "is not a fad, a luxury, or a side line; it is a necessary, integral, vital part of the dyestuffs business"; and Dr. Hodgson, who has in recent years given several thoughtful addresses on the value of Research to the nation, maintains that only where the directorate is capable of guiding and controlling the research work can real progress be made.

Those British firms who have entered the dyestuffs industry since 1914 fully appreciate the value of Research, and much new work has been done; in particular the year 1924 has been noteworthy in producing new methods of dyeing artificial silk; but perhaps the chief feature of the work of 1924 has been the still greater improvement in the quality of the British dyes which now, in shade and purity, are fully equal to the pre-war German colours. Messrs. Brotherton and Co., Ltd., have done much work in this direction, and they have still further increased their range by manufacturing a number of basic colours of fine quality.

British Dyestuffs, Ltd., have increased their range of direct cotton colours, acid wool colours, basic colours and lake colours. They have added another colour to the range of ionamines, red G.A., which, with different treatments, can be made to produce on Celanese the following shades—scarlet, orange-brown, claret, and bordeaux. They have also produced a new group of colours, the Duranol group (patented), which are characterised by good affinity for Celanese, good fastness to washing, acid, alkali, rubbing, hot pressing and light, and by the simplicity of the dyeing process. Four of these colours are already available.

Messrs. Scottish Dyes, Ltd., have also produced new colours for the dyeing of acetyl silk, a series of fast anthraquinone derivatives. They are applied by simple methods which do not require saponification or other treatment of the fibre. They have an excellent fastness to light and they give shades which approach in brilliance those of the vat colours. They are offered under the name of the Celatene colours; and the range consists at present of eight shades.

Perhaps the most noteworthy work which has been done on the manufacture of colours suitable for the dyeing of Celanese was done in the laboratories of the Celanese Company itself; and this company now offers a remarkable range of colours known as the S.R.A. colours which may revolutionise the dyeing of fabrics composed of more than one kind of fibre; for it is possible by their use to use two different shades in one bath, and dye a mixed fabric—e.g., of silk and cotton—in two colours by one process, each fibre selecting its appropriate dyestuff from the mixed dyes.

The year 1924 has thus contributed something to the knowledge of dyestuffs and their application, and further advances may confidently be anticipated in 1925.

# Fish Oils: A Great Norwegian Industry

## From a Correspondent

A GREAT many fish and marine animals yield oil or fat, but the three most important are the cod, herring and whale. Whale oil is generally classed with fish oils, although the whale is not a fish; but in composition and properties, if not in origin, whale oil may, with sufficient scientific consistency, be regarded as a fish oil. Seal oil and one or two others fall into the same category.

The chief centre of the world's fish oil industry is Norway, where it is very highly and efficiently organised, particular attention being paid to scientific research. Newfoundland produces large quantities of cod liver oil, and Japan during the last few years has made appreciable progress in developing a fish oil industry. Japanese chemists have carried out a great deal of useful work in connection with the physical and chemical properties of various fish oils. But neither in Newfoundland nor in Japan is the yield of best quality medicinal cod liver oil so high as it might be, the bulk of the oil produced being of second grade or technical quality, *i.e.*, common cod oil instead of the much more valuable medicinal grade. This latter is the more appreciated now because of its very high vitamine content. Whaling is carried on in many parts of the world, but chiefly in the Antarctic, and though in British territory the industry is mainly in the hands of the Norwegians. The oil is not sent to Norway, but consigned direct to Great Britain and the U.S.A. A certain amount of whale oil comes from South Africa, and small quantities from South America and British Columbia.

### Increase in Whale Oil Production

The production of whale oil has grown enormously during the last quarter of a century. In the period from 1906 to 1913 it rose from 75,000 barrels to 775,000 barrels, the Norwegians being responsible for about 90 per cent. of the output. There was a decline during the war years, but recovery was subsequently rapid, the total world production in 1922-3 being about 800,000 barrels, or 135,000 tons. The very latest figures from the Antarctic for the 1923-4 season indicate a slight falling off. The preliminary figures for the South Shetlands are 125,000 barrels for the Norwegians and 58,000 barrels for the British companies. For South Georgia the Norwegian production is 116,540 barrels. The Norwegians are also active in other parts of the world: in the Ross Sea, off the east coast of Kamtchatka, the west coast of Mexico, and off the coasts of South America. The South African production in 1922 was 16,000 tons (6 barrels to the ton), and 9,060 tons in 1923.

In South Africa, as elsewhere, there is keen controversy as to the possibility of extermination of the whale. Undoubtedly the business has been ruthless in many places, and strict control is essential. The scientific world is perhaps apt to exaggerate the danger of extinction, whilst the commercial world is prone to underrate it.

Whale oil is now largely used as the raw material of the new industry of fat-hardening or hydrogenation. By this process, which is of fundamental importance to the oils, fats and allied industries, liquid oils are converted into hard, tallow-like white fats by the addition of hydrogen in the presence of a catalyst. It forms the subject of innumerable patents, and has been frequently described in the technical press. There are several fat-hardening works in Great Britain, on the Continent, and in the U.S.A. The two in Norway are in Frederiksstad and Sandefjord, and the industry in that country has grown very rapidly; so much so that the exports of hardened fat (A.T. or artificial tallow) increased from 6,500 tons in 1913 to 25,000 tons in 1922 and to 36,300 tons in 1923. Much of it goes to Germany, where it is used for edible purposes. Norway also exports a considerable amount of seal oil: 450,000 gallons in 1923. Norwegian sales of whale and seal oil are entirely in the hands of the Association of Norwegian Whaling Companies, at Sandefjord.

Cod liver oil has always been recognised as possessing very high nutritional and medicinal properties, and there is no doubt that these are very closely connected with its high content of vitamine A. Some exceptionally interesting research work is at present in hand in this direction, both in this country and in Norway. The work of Hopkins, Drummond, Zilva and others has opened up a new epoch in scientific nutrition. A point of fundamental interest in connection with fish oils is, of course, the effect on vitamine content of the various processes to which the oil is subjected in manufacture. The vitaminous and other properties of an oil also vary considerably according to the origin of the oil, the season of the year in which the cod have been taken, and on the age of the cod. Cod liver oil, too, is often mixed with other oils, and this admixture must affect its peculiar properties. (See "Report on the present state of knowledge of Accessory Food Factors, or Vitamines." Second Edition. Published for the Medical Research Council by H.M. Stationery Office, 1924.)

### Extracting the Oil

There are two great cod-fishing seasons in Norway, one at Lofoden, from January to May, and the other at Finmark, from May to August. This latter includes other fish besides cod. The usual methods of obtaining the oil from the livers are either the direct or open steam process, or in closed steam-jacketted pans. For the best quality oil the livers must be perfectly fresh, and the oil is subsequently cold refined, or exposed to a low temperature in order to separate out the stearine. The second quality oil is afterwards obtained from the residue, and the final residue is used for manure or worked up into fish meal. The manufacture of this meal for cattle and poultry food is a considerable industry in Norway, the exports for 1921, 1922 and 1923 being 17,206, 19,593 and 11,651 tons respectively. Large quantities of fish meal are produced in the manufacture of herring oil. Industrial cod liver oil, coast cod oil, or simply cod oil, as it is variously known, is very inferior to the best or medicinal grade. It is used in tanneries, and to a certain extent for soap-making, and for other industrial purposes. Several new methods for the manufacture of cod liver oil have been introduced the last two or three years. In the Rogers electrolytic method (U.S. Pat. 1326968) the chopped up livers are put into a feed tank containing sodium chloride (common salt) at a temperature of 45° C., and thence pumped into the electrolysing chamber, where an electric current is passed through the material, causing the oil to separate out. The mass is then pumped into a settling tank fitted with screens, and then into a centrifugal oil separator. Trials carried out at Bergen in 1921 appear to have been fairly satisfactory so far as the production of technical oils is concerned, but certain modifications were found necessary before using the new method for the manufacture of best grade medicinal oils. Several advantages, however, are claimed, *e.g.*, absence of offensive odour, attainment of maximum purity, complete degreasing of the livers, and continuous and economical working. Some interesting research in connection with the production of a tasteless cod liver oil has been recently carried out by Professor J. Hjort, and some preliminary results obtained at Svolvaer seem to show that it is possible to obtain a much more palatable oil, although not entirely tasteless, without sacrifice of the oil's essential properties. The production of cod liver oil in Norway varies considerably; 1923 was a record year, and the output was nearly 2,000,000 gallons of steamed medicinal oil, and 375,000 gallons of industrial oil. The exports, in tons (246 gallons to the ton), were as follows:—

| | 1913<br>Tons | 1922<br>Tons | 1923<br>Tons |
|---|---|---|---|
| Steam refined cod liver oil .. | 4,277 | 7,081 | 10,500 |
| Other qualities of cod oil and fish oils (excluding whale oil) | 9,142 | 12,749 | 15,800 |

Very little whale oil is actually produced in or exported from Norway. The chief consuming countries are the United Kingdom, the U.S.A., Germany, France, and Czecho-Slovakia. The total British imports of fish oils (including marine animal oils) amounted to 42,818 tons in 1923, 33,280 tons in 1922, and 32,358 tons in 1921. For the first nine months of 1924, the imports amounted to 35,444 tons, of which whale oil accounted for 25,114 tons. In 1923 the U.S.A. imported about 4,000,000 gallons of whale oil, 2,396,000 gallons of cod oil and cod liver oil, and 716,000 gallons of other fish oils (mainly herring and seal), showing very considerable increases over 1922. French imports of fish oils in 1923 were 8,834 tons (7,095 tons 1922,

and 3,631 tons 1921). The corresponding figures for Czecho-Slovakia were 8,117, 3,536 and 6,427 tons respectively. Germany's total imports of fish oil in 1922 were 62,620 tons. Good prices have been obtained, demand is growing and the trade generally is remunerative and progressive. It is a pity that the position in Newfoundland is not quite so satisfactory. The direct steam method in open pans is here used, but as already pointed out the production of best grade medicinal oil is comparatively small, and most of the output is only second grade or technical cod oil. It is possible, of course, that the trade in this latter is quite as remunerative as that in medicinal oil, but the Norwegians seem to find it otherwise, and aim at a maximum production of best grade oil; and it is a little difficult to understand why Newfoundland should be rather backward in this important branch of its great cod industries. No figures are available for total production,* but the exports for the past four years have been as follows:—

| | Refined cod liver oil Galls. | Common cod oil Galls. |
|---|---|---|
| 1920 .. .. .. | 291,350 .. | 1,275,500 |
| 1921 .. .. .. | 46,000 .. | 751,600 |
| 1922 .. .. .. | 49,000 .. | 1,494,000 |
| 1923 .. .. .. | 51,000 .. | 1,320,000 |

The manufacture of herring oil and meal in Norway is a comparatively new industry, but its development there has been exceedingly rapid. Some attempts have been made to establish a similar industry on a small scale in this country, and numerous feeding experiments have been carried out at agricultural stations to test the value of fish meal as a poultry and cattle food. Scotland (Aberdeen, etc.) produced 3,000 tons oil, and some meal, in 1920. A large number of herring oil factories have been established along the coasts of Norway, and the export of herring oil has increased from 275,000 gallons in 1907 to 440,000 gallons in 1913, and to 1,700,000 gallons in 1921. The record figure of 1921 has not, however, been maintained the last year or two, having fallen to about 750,000 gallons. Herring oil is obtained either from the whole herring (the fat herring) or from the offal. In the beginning of the herring season, which lasts from July to February, the herring is very fat, and yields a high percentage of oil, *i.e.*, one barrel of oil (44 gall.) per 6 maal (200 gall.) of herrings. The average yield for the whole season is much lower, namely, 8 to 10 per cent. of the bulk. In the south of Norway, at Haugesund and Stavanger, the oil is obtained chiefly from the brisling and spring herring offal. The oil is extracted by boiling and pressing, and is afterwards clarified and refined. It is largely used in tanneries and, to a certain extent, in soap-making. The principal consuming country is Germany. As is also the case with cod liver oil, there is a well-organised sales association for the whole of Norway, with two centres: one in the north and one in the south. Large quantities of herring meal are exported. The total exports of fish meal from Norway in 1923 were 11,651 tons, as compared with 19,593 tons in 1922.

Large quantities of fish oil are also produced in Japan, mainly herring oil, and the exports in 1916, 1917, and 1918 were 18,250, 14,380, and 14,120 tons respectively. A certain amount of herring oil is manufactured in Newfoundland, and a new factory has just been built at Twillingate, with a capacity of 100,000 barrels per annum.

### Chemicals and the Argentine

A RECENT Department of Overseas Trade report on the commercial conditions of the Argentine Republic states that in heavy chemicals and drugs trade during 1924 has been normal with a tendency to improve. The Argentine is a great importer of chemical products for her various expanding industries, and although British manufacturers have received a fair proportion of the trade, there are certain products which it has only been possible to import from Germany on account of considerably lower prices. In addition there is a certain amount of competition from the United States, but not to the extent of that from Germany. In drugs and patent medicines trade has improved with the liquidation of the enormous stocks brought out from Germany after the war. Of imports in drugs in 1923 which totalled 3,657,198 kilos., Germany supplied 30 per cent., the United States 27 per cent., and the United Kingdom 16½ per cent.

* The total production of fish oil in Canada in 1920 was 8,100 tons or 2,000,000 gallons.

## A Mixed Ammonia-Phosphate Fertiliser

### Results of Danish Research

IN a publication we have received from Copenhagen, an interesting account is given by Messrs. A. H. M. Andreasen and P. E. Raaschou of research work done in the General Technical Chemistry Laboratory of the Royal Technical College, Copenhagen, concerning "Fertilisers containing Nitrogen and Phosphoric Acid, and produced by treating Superphosphate with Ammonia."

The object of the research was to examine the possibilities of manufacturing, by the action of ammonia on superphosphate, a mixed nitrogen and phosphoric acid fertiliser, called ammonia-phosphate, and to ascertain (1) the run of this reaction; (2) the influence of the conditions of manufacture on the solubility of the reaction products; (3) further, to make investigations concerning the solubility of various ammonia-phosphates and other phosphates; and (4) to make tests of fertilisers in order to ascertain their fertilising value.

With respect to the first point, the question has been elucidated by determining (*a*) the modification of the hydrogen-ion concentration as a function of the quantity of ammonia added to a solution of monocalcium-phosphate; (*b*) the modification of the hydrogen-ion concentration as a function of the quantity of ammonia added to a solution of superphosphate, and (*c*) the modification of the hydrogen-ion concentration as a function of the quantity of gypsum and ammonia added to a solution of monocalcium-phosphate. The experiments showed that the presence of gypsum in superphosphate influences the run of the reaction when water is present.

As regards solubility, the investigation proved that several factors exert an essential influence on the degree of solubility of the phosphoric acid in ammonia-phosphates. For instance, when during the chemical reaction between ammonia and superphosphate the process is conducted at low temperature and with dried superphosphate, there may be attained neutral products which contain about 7 per cent. of nitrogen calculated as $NH_3$ the contents of which are soluble in water, and 18 to 19 per cent. of phosphoric acid calculated as $P_2O_5$ the phosphoric acid contents of which, up to a percentage of 96 to 98, are soluble in a citrate solution, according to Wagner, with a $p_H$-value equalling 6 and showing a considerable percentage of phosphoric acid soluble in water, while without these measures being taken during the manufacture products of essentially smaller solubility will be attained.

Thirdly, the importance of working with citrate solutions, according to the Wagner method, with well-defined hydrogen-ion concentrations was demonstrated. The comparison between the solubility of ammonia-phosphates and other phosphates included various reaction products between superphosphate and calcium carbonate, of a kind which might be formed in a soil containing calcium-ions, when using superphosphate as manure, as well as the so-called "reform phosphates" produced in the laboratory by addition, to the raw phosphate, of a smaller quantity of sulphuric acid than was necessary for the production of superphosphate.

The solubility investigations indicated that in the production of ammonia-phosphates from dried superphosphate at low temperature, it would be possible to save the quantity of sulphuric acid which otherwise was necessary for binding the ammonia, and to do this without lowering the fertilising value, in respect to nitrogen and phosphoric acid, of the product as compared with the fertilising values of ammonia sulphate and superphosphate respectively.

Finally, in order to judge of the correctness of these conclusions, further fertilising tests were held to be desirable, and these are now proceeding.

### Electric Furnaces for Laboratories

To meet the requirements of laboratories for higher temperatures than can be obtained by the ordinary nickel chromium resistance type of muffles, the Wild-Barfield Resistor Furnace has been produced and is illustrated in a new booklet by Townson and Mercer, Ltd., of 34, Camomile Street, London, E.C.3. The heating elements of this furnace consist of two carborundum rods inserted in special contacts in the roof of the furnace. These furnaces are normally used up to 1,300° C., at which temperature the resistor bars will usually last about one week. Higher temperatures not exceeding 1,500° C. can be obtained, with consequent shortening of the life of the bars. An extensive range of furnaces of all sizes is also dealt with.

## Fertilisers and Feeding Stuffs

### Advisory Committee Appointed

THE Report of the Departmental Committee on the Fertilisers and Feeding Stuffs Act, 1906 (Cmd. 2125), presented to the Minister of Agriculture and Fisheries in March last, recommends far-reaching alterations in the machinery to prevent adulteration and misdescription of fertilisers and feeding stuffs.

One of the suggestions of the Departmental Committee was that, if the general proposals contained in the Report were accepted, a further committee should be set up to frame schedules setting out the articles to which revised legislation should apply, the definition of each of these articles and the particulars to be stated in the invoice, and also in the description applied to the article in each case. This Advisory Committee, which has power to co-opt, has now been constituted as follows :—

Lord Clinton (chairman), Mr. E. G. Haygarth Brown, Dr. Charles Crowther, Ph.D., Mr. J. Garton, Mr. C. W. Higgs, Mr. Arthur Holgate, Mr. Thomas Kyle, Mr. Alexander Main, B.Sc., Lieutenant-Colonel R. L. Norrington, Mr. J. W. Pearson, Mr. R. R. Robbins, Sir E. J. Russell, D.Sc., F.R.S., Mr. John Speir, Mr. George Stubbs, F.I.C., Dr. J. F. Tocher, D.Sc., F.I.C., Professor T. B. Wood, F.I.C., F.R.S., and Mr. H. J. Johns, of the Ministry of Agriculture and Fisheries, 10, Whitehall Place, S.W.1 (secretary).

The terms of reference are :—

(1) To draw up schedules for the purpose of prescribing—(*a*) The fertilisers and feeding stuffs to which all the provision of proposed legislation on the lines of the Report of the Departmental Committee on the Fertilisers and Feeding Stuffs Act, 1906, should apply, and those to which only the civil provisions of such legislation should apply ; (*b*) Definitions of each of the articles or classes of articles mentioned above ; (*c*) The statement as to the constituents present, and also as to the absence of certain substances in some instances which should be given in descriptions and invoices ; (*d*) Those commodities which should be regarded as " worthless," or " deleterious " ; and

(2) To recommend the terms in which the valuable constituents should be stated in descriptions and invoices.

## A Comprehensive Plant Catalogue

A CATALOGUE recently issued by Joseph Foster and Sons, Ltd., of Soho Foundry, Preston, takes the form of a series of illustrations of plant installed by the firm. These are mainly pumping and factory engines, but among them may be noted


one or two examples of chemical plant. For instance, there is a very fine example of a large chemical mixing tank, with a steam-jacketed bottom-plate, and double reduction stirring gear. Other plant of interest to chemical manufacturers includes high pressure tanks, large benzol agitating tanks, and tank wagons.

## Important German Chemical Developments

THE firms belonging to the Dye Trust are converting their paper mark capital into gold marks at the ratio of 5 to 1. Within the Trust, reorganisation is contemplated in the technical and commercial structure, according to *The Times Trade Supplement*. The agencies of the different firms in Japan have been fused and negotiations for mergers within the Trust are pending. It is said that the Gesellschaft für Anilinfabrikation, Berlin, and the Chemische Fabrik Griesheim-Elektron, Frankfurt-on-Main, which are already selling their products through joint branch offices, are contemplating a complete merger. Griesheim is transferring some of its manufacturing departments from Frankfurt to Bitterfeld, where abundant and cheap supplies of lignite are available. The Badische Anilin und Sodafabrik is negotiating for the erection of a chemical factory in Norway which would utilise the water power station at Glomfjord.

The nitrate industry has made such progress that Germany can dispense with Chile saltpetre and even afford to export part of her output. German consumption amounts to about 300,000 tons of pure nitrate per annum. Through the extension of home production of synthetic nitrate at Oppau and Merseburg prices have been brought down to about 30 per cent. below the cost of Chile saltpetre. Other producers of nitrate fertilisers—e.g., the cokeries and gasworks—have had to make equivalent reductions.

Wages in the German chemical industry were raised recently, and in group 1 (districts where the cost of living is above the average) 0·63-0·66 marks an hour (about 7½d. to 8d.) are paid to skilled men, and 0·52-0·54 (about 6½d.) to labourers. Married men receive 2d. per shift extra and 2d. for every child. In Group 2 (provincial districts) wages are 6 per cent. lower than in Group 1.

The German Rock Salts Syndicate has now been joined by the Preussische Bergwerks und Hütten Gesellschaft, and all the producers are thus amalgamated.

## The Japanese Dye Market

ACCORDING to an official report from the U.S. Consul at Tokyo, the Germans, in order to maintain their hold upon the market, have been selling at prices too low to be profitable, despite a 15 per cent. increase in April to offset increased production costs and the adverse exchange rate. The limitation of imports has not as yet operated to raise prices, since the demand is slight and large stocks were imported before the restrictions went into effect. In spite of the strenuous efforts of the Japanese to establish a dye industry of their own, the Germans still control the market and are so firmly established that it will be some time before they give ground to any great extent.

Indigo presents a condition even worse than that of general dyestuffs. The German merchants have persistently lowered prices, and others have had to sell at unprofitable prices or be driven out of the market. The crop of domestic natural indigo, which it was thought would amount to about 5,000,000 yen for this year, is now estimated at about 1,500,000 yen, due to the drought, which was felt most severely felt in western Japan.

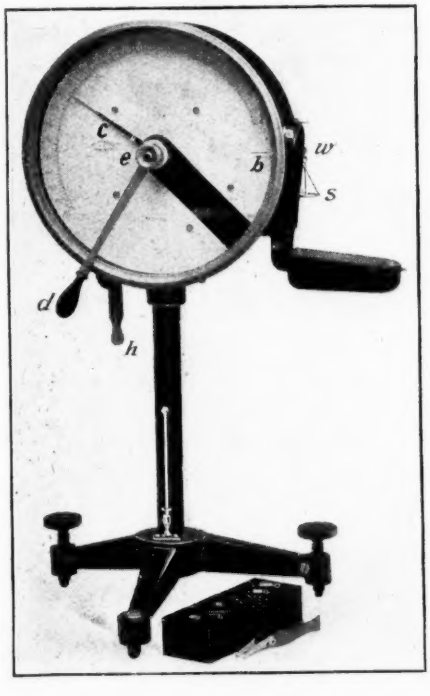
## American Dyes the Cheapest in the World

DR. CHARLES H. HERTY, president of the U.S.A. Synthetic Organic Chemical Manufacturers' Association, at the annual meeting of the association in New York, said that American consumers were to-day paying less for dyes than were the consumers of any other countries of the world, and if the present-day value of the dollar be taken into consideration, American dyes were being sold cheaper to-day in America than were German dyes before the war. He pointed out in detail that during the year 1923, 382,000,000 pounds of synthetic organic chemicals were sold, valued at $165,000,000. In dyes, 177 new products were officially announced to the Appraiser of the Port of New York. Remarkable work had been done in the field of synthetic resins, and an almost complete line of biological stains was now made in America. In commenting on the tariff, Dr. Herty favoured its retention. Domestic consumers, he said, were profiting by the keenness of domestic competition in manufacturing, and it was known that German prices bore no relation to cost of production.

## The "H.B." Precision Torsion Balance

THIS patent balance—the result of long experience and careful investigation—weighs with the greatest accuracy the very lightest objects with remarkable rapidity. The movement of the balance arm is dead-beat and the scale is easily legible. Owing to the precision and rapidity of its operation, this balance has been adopted for weighing large quantities of light objects, both for industrial and for medical purposes, and should be found of great use in chemical laboratories.

The general appearance of the instrument is shown in the illustration. It will be seen that mounted on a solid three-legged base is a circular pillar carrying a metal housing of 7½ inches diameter and 3 inch depth, containing the mechanism and scale at a convenient height for comfortable use. The hand " d " can be adjusted on its axle to suit the convenience of the operator. Damping is obtained by means of an aluminium vane swinging between the jaws of a permanent magnet. A milled nut at the back of the instrument serves for zero adjustment. The hook " w " and scale pan " s " on which




objects to be weighed are placed, are protected when not in use by a hinged cap. The knife edge pointers pass in front of a mirror, sunk behind the scale, so that both accurate coincidence and freedom from parallax errors are ensured. The balance has a handsome appearance, in smooth black, with nickel-plated finish.

To weigh an object the balance is first levelled by means of the levelling screws and the plumb-bob. The reading pointer " c " is turned by means of the lever " d " to its maximum scale reading, and the object to be weighed is placed on the hook or in the scale pan; the moving of the lever " h " then sets the balance free. The arm " d " rotates clockwise until the pointer " b " comes to the zero position. The figure opposite the pointer " c " is the weight of the object in milligrammes.

The objects to be weighed, when in the form of wire or fibre, can usually be laid direct on the hook " w," but granular and other matter requires a scale pan constructed of appropriate material. Balancing and other saddles may also be required. All these are made of the same weight, and this weight is taken into consideration in the calibration of the Torsion Balance. For determining the exact accuracy of the balance at any time or at any particular point, a supplementary weight of desired mass can be supplied.

### Arsenic Workers Idle

OWING to the slump in the price of arsenic a number of workmen have been dismissed at the Bedford United Mine, Gunnislake, one of the most important arsenic mines in the country. During the war arsenic reached £100 a ton, and after remaining steady at £70 for a long time, it has now dropped to £30, at which price its production is unremunerative.

Two other arsenic mines, the Gang Mine at St. Teath and that at Radmore, near Callington, which were opened up recently and expensive machinery installed, when the price was £70 a ton, are being seriously hit by to-day's slump. Cornwall produces more arsenic than any other county in the United Kingdom, and ships considerable quantities to Australia and Canada.

Arsenic mining is not, as might be thought, a dangerous trade within the Home Office meaning of the term, and in spite of the deadly character of the poison, men work in comparative safety. The mineral is found somewhat near the surface, in the form of a mud-coloured ore. This is pounded and washed, and then, still containing about 70 per cent. of impurity, is cast into a special kiln and burned. After it has gone through the process of milling in another part of the mine premises, it issues as a snowy white powder 99 per cent. pure arsenic, and it is then shovelled into barrels by men who work either with their nostrils plugged with cotton wool or a handkerchief tied over their mouth and nose to protect themselves against the poisonous fumes.

### Aniline Worker and Cancer

AN inquest was held on Wednesday, December 31, on Richard Hughes, aged 56, of Little Grant Street, Blackley, Manchester, who died on December 29. Hughes was employed as a chemical foreman by the British Dyestuffs Corporation, Ltd., and had worked in the dyestuffs industry for over thirty years, occupying the position of foreman since 1918. In the course of evidence it was stated that Hughes had complained of stomach pains, which he attributed to the effects of " brown " acid with which he occasionally worked. The chief trouble seemed to be in the throat.

Thomas Warburton, a chemist at the works, said he had known the man for about 26 years, and for a number of years Hughes had been foreman under him. Hughes at times had dealt with small batches of brown acid. In reply to a question, witness said the manufacture of T.N.T. was not included in his section of the works. Medical evidence was given by Dr. Norman Kletz, who expressed the opinion that death was attributable to an extensive malignant growth in the bladder. He was aware that there were certain aniline products which were associated with cancer on the bladder, but as far as he knew the products which Hughes dealt with were not included in them. He considered that the inhalation of a certain amount of nitrous fumes would set up irritation of the upper respiratory channels.

A verdict of " Death from natural causes " was returned.

### Birmingham University Extensions

CONSIDERABLE extensions will shortly be carried out at the Birmingham New University buildings, Edgbaston. At the present time the biological departments, which include zoology, botany and brewing, are housed in Mason College buildings, in the centre of Birmingham. They are the only science departments left there, all the others having been removed to Edgbaston. Further accommodation is required by the Medical School and the Arts Departments in Mason's College, and it is therefore necessary to proceed with the biological block on the site at Edgbaston. Another important extension contemplated is in connection with the department of oil mining; this department is now housed in the coal mining and metal mining block of the Edgbaston buildings. The latter departments require more accommodation, so that the new buildings for the oil department will be erected near the power station. The oil mining is the most recently established department of applied science in the Birmingham University, and considerable success has already been achieved. The head of the Department is Professor Nash, who was formerly lecturer to the late Professor R. R. Thompson.

### Chemical Trade Movements in 1924

The annual article by Mr. W. G. Wilson reviewing the chemical trade movements of the year will be published in our next issue.

# From Week to Week

DR. J. E. MACKENZIE, Lecturer in Chemistry at Edinburgh University, has been appointed Reader with a seat on the Faculty of Science.

PROFESSOR V. WHEELER read a paper on "The Application of Producer and Coke Oven Gas to the Metallurgical Industry" before the West of Scotland Iron and Steel Institute on Tuesday last.

THE DEATH is announced, at Johnstone, of Mr. J. B. Biggart, senior partner of David Biggart and Sons, cotton spinners and bleachers, of Johnstone. Mr. Biggart, who founded the firm 50 years ago, was in his eightieth year.

PROFESSOR GERLACH of Frankfort has been invited to occupy the chair of physics at the University of Tübingen in succession to Professor F. Paschen, who was recently appointed president of the Physikalisch Technische Reichsanstalt in Berlin.

POTASSIUM CYANIDE and other chemicals, used by an engraver's process operator of West Norwood, were said by a doctor to have been the primary cause of infection resulting in his death from blood poisoning, following a cut while shaving.

ALL ARTIFICIAL AND NATURAL ORGANIC COLOURS, with certain exceptions, and all colours containing arsenic, antimony, and various other compounds are now classed as harmful by an Italian Decree, and their use in manufacture prohibited.

PROFESSOR C. VERNON BOYS has been awarded the second Duddell Memorial Medal by the Physical Society of London. The award is "for the advancement of knowledge by the invention or design of scientific instruments or by the discovery of materials used in their construction."

GROSVENOR HOUSE (LIMITED) has been registered as a private company with a capital of £100,000. The first directors are Viscount Leverhulme and Mr. W. H. Lever. Grosvenor House, it may be recalled, was formerly the London residence of the Duke of Westminster.

THE CURRENT ISSUE OF *Nature* contains in the series of "Scientific Worthies" an appreciative article on the scientific work of Professor I. P. Pavlov, For.Mem.R.S., by Professor E. H. Starling, F.R.S., Foulerton Professor of Physiology. It is accompanied by a separate photogravure plate portrait of Professor Pavlov, suitable for framing.

THE NICHOLS MEDAL, established by Dr. W. H. Nichols and awarded annually by the New York section of the American Chemical Society, has been awarded for 1924 to Dr. Edward Curtis Franklin, professor of organic chemistry in Leland Stanford University, California. The medal is bestowed "for the research published during the current year which in the opinion of the jury is most original and stimulative to further research." Dr. Franklin is one of the best known of American chemists, and last year was president of the American Chemical Society.

PROFESSOR JAMES KENDALL, of the Department of Chemistry, Columbia University, has been elected chairman for 1925 of the New York section of the American Chemical Society. Dr. B. T. Brooks, consulting chemist, was chosen vice-chairman, and Mr. D. H. Killeffer, associate editor of *Industrial and Engineering Chemistry*, secretary-treasurer. Professor Kendall was born in England in 1889. He received the degrees of A.M. and B.Sc. from Edinburgh University in 1910, and Sc.D. in 1915, later studying at Heidelberg, Stockholm and Petrograd. He was Vans Dunlop scholar in chemistry at Edinburgh during 1909–12. He became an instructor in chemistry at Columbia in 1913, assistant professor in 1915, associate professor in 1916, and professor in 1922. During 1919–23 he was acting professor of chemistry in Stanford University, and in the latter year in the University of California. Professor Kendall went to the United States in 1913, and became an American citizen in 1917. During 1917–19 he was a lieutenant in the U.S. Forces assigned to special duty for the Bureau of Ordnance as liaison officer with the allied navies on the subject of naval gas warfare. He is a Fellow of the American Association for the Advancement of Science and a Member of the London Chemical Society.

THE LONDON UNIVERSITY DEGREE of M.Sc. (Chemistry) for internal students has been awarded to Mr. F. C. Wood, East London College.

REPORTS STATE THAT Astroms Factories, Ltd., the largest chemical technical concern in Finland, has passed under the control of Lever Brothers, Ltd.

A PARAGRAPH in last week's issue under the heading "Industrial Sands," referred to Mr. A. G. Curtis. This should have read Mr. A. L. Curtis, of Westmoor Laboratory, Chatteris.

DR. J. REILLY, Assistant State Chemist to the Irish Free State, has been appointed Professor of Chemistry in University College, Cork (National University of Ireland), in succession to Professor A. E. Dixon.

A BURST DAM at the works of the Mathieson Alkali Works, Haltville, Virginia, is said to have resulted in a serious flood causing many deaths. The dam was constructed from a lime by-product of the works.

AT A MEETING OF THE CREDITORS of Austen Byass and Co., Ltd., oil merchants, of 4, King Street, London, E.C., in voluntary liquidation, it was stated that creditors would be paid 20s. in the £ before the end of January, 1925.

JAMES MELLIS & Co., soapmakers, of Prestonpans, have forwarded the usual set of re-fills for their desk calendar and memorandum. Well and boldly printed, this calendar forms an advertisement which is both useful and effective publicity.

PRINCE FERDINAND DE LIECHTENSTEIN, who, on January 14, is to be married to Miss Shelagh Brunner, daughter of Mr. Roscoe Brunner, is, according to reports, to take an active part in the firm of Brunner, Mond & Co., after gaining banking experience.

THE TWENTY-SIXTH ROBERT BOYLE LECTURE on "Mass Spectra and Isotopes," delivered by Dr. F. W. Aston, has been published in booklet form by Humphrey Milford, Oxford University Press, Amen House, Warwick Square, London, E.C.4. The price is 1s. net.

MR. HARRY SMITH, F.I.C., has been appointed a director of John Mathews and Co., Ltd., of Liverpool and London, to which firm he has been attached professionally as head chemist since 1921. During the last thirty years Mr. Smith has been actively engaged in research work and technical supervision with well-known firms.

EVERSHED AND VIGNOLES, LTD., announce that reductions in price varying up to 25 per cent. on standard models of the Ducter low resistance testing set equipments take effect from January 1. The Ducter covers in various models the complete range of low resistances from one microhm up to 10 ohms and is used for a great variety of conductor testing including rail bonds, armatures, fuses, joints, cable sheathing, etc.

THE BRITISH ASSOCIATION OF CHEMISTS, owing to the continued illness of Mr. A. Stewart-Mills, has appointed an honorary associate secretary to assist the general secretary. The associate secretary is Mr. Henry T. F. Rhodes, of 20, Queen Anne's Grove, London, W.4 (Richmond 357). Mr. Rhodes attends at the head office, during the mornings, approximately ten times a month, and can be seen there by appointment.

THE BRITISH GLASS TRADE, and particularly that section of it which caters for the cheaper grades, has had a disappointing year. Competition from abroad, especially from Czecho-Slovakia, has been most acute. The fact that the protection which the trade enjoyed under the Safeguarding of Industries Act came to an end had a very prejudicial effect on some departments. While all branches of the industry suffered from lack of stability, those concerned in the manufacture of high grade glass have emerged from the depression tolerably well, and to-day evidence is not wanting of improved inquiries from overseas, and these are not limited by any means to places within the Empire. There have lately been some very fair shipments to the United States, and although export to the Continent is nothing like what it was formerly, it again shows some growth, and, curiously, to countries from which the commonest glass is exported to Great Britain.

# References to Current Literature

## British

COAL.—Examination of the banded constituents of a Derbyshire coal. H. D. Greenwood. *J.S.C.I.*, December 26, 1924, pp. 363–365T.

ELECTRO-CHEMISTRY.—Modern electrolytic cells. Part III. A. J. Hale. *J.S.C.I.*, December 26, 1924, pp. 1291–1294.

BENZIDINE DERIVATIVES.—Preparation of isodiphenetidine. J. R. H. Whiston. *J.S.C.I.*, December 26, 1924, pp. 369–370T.

ACIDS.—The preparation of naphthalic acid by oxidation of acenaphthaquinone. J. R. H. Whiston. *J.S.C.I.*, December 26, 1924, p. 370T.

COTTON.—The moisture relations of cotton. The effect of temperature on the absorption of water by soda-boiled cotton. A. R. Urquhart and A. M. Williams. *J. Text. Inst.*, December, 1924, pp. 559–572T.

WATERPROOFING.—The waterproofing of fabrics. D. Anthony-Langsdale. *J. Text. Inst.*, December, 1924, pp. 598–602P.

CRYOSCOPY.—Cryoscopic measurements with nitrobenzene. Part II. The variation of the molecular depression with water content. F. S. Brown and C. R. Bury. *Chem Soc. Trans.*, November, 1924, pp. 2219–2226.

The measurement of the vapour pressures of aqueous salt solutions by the depression of the freezing point of nitrobenzene. N. V. Sidgwick and E. K. Ewbank. *Chem. Soc. Trans.*, November, 1924, pp. 2268–2273.

OXIMES.—The isomerism of the oximes. Part XX. The isomeric *p*-nitrobenzophenone oximes and their four methyl ethers. O. L. Brady and R. P. Mehta. *Chem. Soc. Trans.*, November, 1924, pp. 2297–2304.

SULPHOXIDES.—Derivatives of aniline disulphoxide. C. M. Bere and S. Smiles. *Chem. Soc. Trans.*, November, 1924, pp. 2359–2363.

COLLOIDS.—The dissolution of substances in mixed liquids with special reference to colloids. E. W. J. Mardles. *Chem. Soc. Trans.*, November, 1924, pp. 2244–2259.

## United States

SUGARS.—A method for the manufacture of laevulose. R. F. Jackson, C. G. Silsbee and M. J. Profitt. *J. Ind. Eng. Chem.*, December, 1924, pp. 1250–1251.

Colloids in cane and beet sugar manufacture. H. S. Paine, M. S. Badollet and J. C. Keane. *J. Ind. Eng. Chem.*, December, 1924, pp. 1252–1258.

VANILLIN.—Solubilities of vanillin. C. E. Mange and O. Ehler. *J. Ind. Eng. Chem.*, December, 1924, pp. 1258–1260.

ABSORPTION.—Comparative absorption rates for various gases. W. G. Whitman and D. S. Davis. *J. Ind. Eng. Chem.*, December, 1924, pp. 1233–1237.

Absorption of hydrogen sulphide. F. W. Sperr. *J. Ind. Eng. Chem.*, December, 1924, pp. 1237–1239.

ANALYSIS.—Sources of error in the determination of phosphoric acid by the molybdate-magnesia method. J. M. McCandless and J. Q. Burton. *J. Ind. Eng. Chem.*, December, 1924, pp. 1267–1270.

Quantitative analysis of mists and fogs, especially acid mists. H. C. Weber. *J. Ind. Eng. Chem.*, December, 1924, pp. 1239–1242.

The interference of ammonia with the hypochlorite reaction for aniline. E. S. West. *J. Ind. Eng. Chem.*, December, 1924, pp. 1270–1271.

WOOL.—Classification of the methods of dyeing wool. Part III. J. M. Matthews. *Color Td. J.*, July, 1924, pp. 7–9.

Chlorination of wool for industrial purposes. L. Meunier and H. Latreille. *Color Td. J.*, October, 1924, pp. 115–117.

CHLORINE.—Technical use of liquid chlorine in France. H. Barthelemy. *Color Td. J.*, November, 1924, pp. 148–150.

DYESTUFFS.—Orange II. R. Sansone. *Color Td. J.*, November, 1924, pp. 130–131.

Developments in green vat dyes. L. J. Hooley. *Color Td. J.*, October, 1924, p. 104.

SOAPS.—Importance of benzine soap to the dry cleaning and garment dyeing industries. J. M. Matthews. *Color Td. J.*, September, 1924, pp. 79–82.

PHOTO-CHEMISTRY.—Alteration of dyed colours in light. Dr. Haller. *Color Td. J.*, November, 1924, pp. 134–136.

VITAMINS.—Vitamins in canned foods. Part II. The vitamin C destructive factor in apples. E. F. Kohman, W. H. Eddy and V. Carlsson. *J. Ind. Eng. Chem.*, December, 1924, pp. 1261–1263.

TECHNOLOGY.—A typical problem in chemical engineering development. (White lead manufacture.) J. H. Calbeck. *Chem. Met. Eng.*, December 15, 1924, pp. 920–924.

What a chimney has to do. *Chem. Met. Eng.*, December 15, 1924, pp. 930–933.

Superheated steam insulation pays. R. H. Heilman. *Chem. Met. Eng.*, December 15, 1924, pp. 934–936.

COLLOIDS.—Some recent advances in the field of colloids. T. Svedberg. *Chem. Reviews*, October, 1924, pp. 249–275.

RARE ELEMENTS.—The systematic detection of the rarer chemical elements. A. A. Noyes and W. C. Bray. *Chem. Reviews*, October, 1924, pp. 277–291.

## German

OPTICALLY ACTIVE COMPOUNDS.—The influence of constitution on the rotary power of optically active substances. Part XVIII. The anomalous rotation dispersion of ketones. E. Kopp. *Annalen*, December 20, 1924, pp. 215–241.

MOLECULAR COMPOUNDS.—Quinhydrones. P. Pfeiffer. *Annalen*. December 20, 1924, pp. 241–264.

Molecular compounds of aromatic aminoketones. P. Pfeiffer. *Annalen*, December 20, 1924, pp. 265–289.

ACIDS.—The pyrogenic decomposition of abietic acid. K. A. Verterberg and E. Borge. *Annalen*, December 20, 1924, pp. 305–310.

ANALYSIS.—The determination of the reducing power of cellulose preparations. W. Weltzien and K. Nakamura. *Annalen*, December 20, 1924, pp. 290–304.

The separation of small quantities of calcium from large quantities of magnesium. V. Rodt and E. Kindscher. *Chem.-Zeit.*, December 24, 1924, pp. 953–954.

DRYING.—Drying and chemical industry. Part II. Milk and casein. M. Winckel. *Chem.-Zeit.*, December 18, 1924, pp. 941–942.

NITRATE.—The origin of Chilian saltpetre. J. Stocklasa. *Chem.-Zeit.*, December 20, 1924, pp. 949–950.

CELLULOSE.—New results of cellulose research. K. Hess. *Z. angew. Chem.*, December 18, 1924, pp. 993–1003.

Reserve cellulose and cellulose. P. Karrer. *Z. angew. Chem.*, December 18, 1924, pp. 1003–1007.

The absorption by cellulose of sodium hydroxide from aqueous solution. W. Vieweg. *Z. angew. Chem.*, December 18, 1924, pp. 1008–1010.

Alkali cellulose. E. Heuser. *Z. angew. Chem.*, December 18, 1924, pp. 1010–1013.

## Miscellaneous

ACIDS.—The effect of boric acid on the solubility in water and on the conductivity of some *y*-pyrone carboxylic acids; some data concerning meconic acid, comenic acid and chelidonic acid. P. E. Verkade. *Rec. Trav. Chim. des Pays-Bas*, December 15, 1924, pp. 879–893.

ANALYSIS.—The estimation of oxygen in organic compounds. Part II. H. ter Meulen. *Rec. Trav. Chim. des Pays-Bas*, December 15, 1924, pp. 899–904.

DYESTUFFS.—New syntheses in the quinone-imide group of dyestuffs. Parts V, VI and VII. F. Kehrmann. *Helv. Chim. Acta*, December 1, 1924, pp. 973–991.

SILK.—The weighting of silk with stannic chloride. F. Fichter and F. Reichart. *Helv. Chim. Acta*, December 1, 1924, pp. 1078–1082.

DYEING.—The influence of the size of the particles of dyestuffs on the dyeing process. P. Ruggli and A. Fischli. *Helv. Chim. Acta*, December 1, 1924, pp. 1013–1018.

NITROSO COMPOUNDS.—The preparation and reactions of isonitroso-acetanilide. P. Karrer, G. H. Diechman and W. T. Haebler. *Helv. Chim. Acta*, December 1, 1924, pp. 1031–1039.

# Patent Literature

## Abstracts of Complete Specifications

225,262. INSECTICIDES, MANUFACTURE OF. British Dyestuffs Corporation, Ltd., and V. Lefebure, 70, Spring Gardens, Manchester. Application date, August 2, 1923.

The object is to combine toxic insecticidal compounds with other materials to form a compound which, under soil conditions, will free the toxic insecticide. Chlorpicrin cannot normally be used owing to its toxic effects, but it has been found that it may be combined with ammonia and/or pyridine or aniline or *o*-toluidine to form a double compound which is readily decomposed. This double compound may be handled without toxic effects. Similar double compounds may be formed with 1 : 2 : 4-chlor-dinitro-benzene. These compounds may be made by passing both vapours (chlorpicrin and ammonia) over an absorbent such as silica gel or charcoal, or in the case of 1 : 2 : 4-chlor-dinitro-benzene, by charging the absorbent with ammonia or pyridine, aniline or *o*-toluidine, and mixing with the chlor-dinitro-benzene. Some detailed examples are given.

225,263. NITRIC OXIDE, PROCESS FOR OBTAINING. C. G. Redfern, London. From J. Pintsch, Akt.-Ges., 71–73, Andreasstrasse, Berlin. Application date, August 18, 1923.

Fuel gas and air are preheated and then burned at such a temperature that nitric oxide is formed, and the combustion gases are then cooled on water-cooled surfaces, such as the walls and tubes of a steam boiler. The temperature employed is much higher than in ordinary furnaces, and the speed of circulation of the water in the boiler may be artificially increased to avoid burning through the tubes. The high temperature of combustion may be made dependent on the circulation by throttling the preheated gas and air, or by adding cold fuel gas. In this method it is not necessary to employ catalytic substances or pure oxygen.

225,337. FURNACES FOR DISTILLATION AND CARBONISATION. F. Duplan, 8, Route de Villeguif, Arcueil, Seine, France. Application date, October 16, 1923.

The heating chamber of this furnace receives heat only from the base plate heated by burners below, and the roof is constituted by two plates separated by an adjustable space. This space is so adjusted that the temperature of the inner plate is sufficient to prevent any condensation, and insufficient to cause dissociation. The base plate may have a refractory lining.

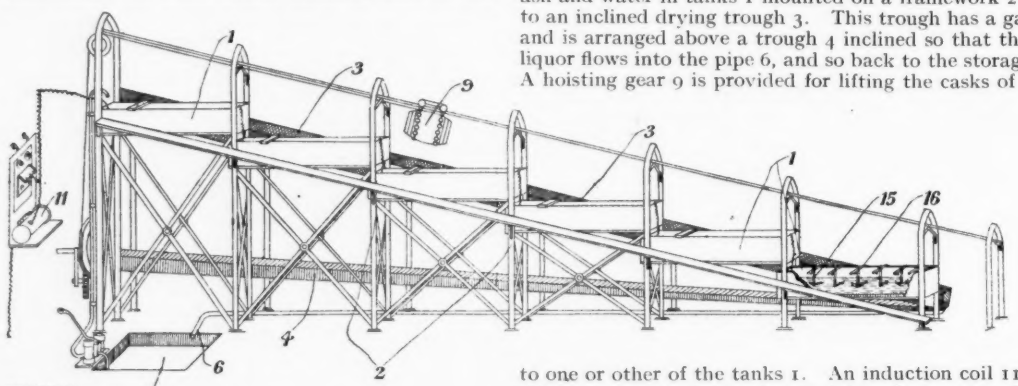
225,369. PURE CARBAZOL, PROCESS OF MANUFACTURING. L. Weil, 80, Schlüterstrasse, Hamburg, and Chemische Fabrik in Billwärder vorm. Hell and Sthamer Akt.-Ges., 28, Billbrookdeich, Hamburg-Billbrook, Germany. Application date, November 20, 1923.

Carbazol as usually obtained from its mixture with anthracene contains a considerable proportion of by-products, from which it may be separated by repeated crystallisation from solvents with subsequent distillation in vacuo. It has now been found that pure carbazol may be obtained from crude carbazol by distillation in the presence of hydrocarbons or other organic solvents which boil at 200°–360° C. Pure carbazol distils from such a mixture at a temperature above 200° C., and crystallises from the distillate. If the distillation and crystallisation are repeated, carbazol of 94 per cent. purity can be obtained. A suitable solvent in this process is gas oil of a specific gravity 0·84, obtained by distilling kerosene oil with steam, and removing the low boiling hydrocarbons until the specific gravity reaches 0·84 and the boiling point 240°–280° C.

In an example, crude carbazol is obtained by extracting anthracene with pyridine and distilling off the pyridine, and 100 parts are mixed with 50 parts of gas oil. This mixture is distilled at about 200° C., and the carbazol and gas oil distil over. The carbazol is crystallised out, washed with benzene, and dried, yielding a product of 90 per cent. purity, which may be increased to 95 per cent. by repeating the process. The distillation may alternatively be effected in vacuo, or with simultaneous admission of steam. Reference is directed in pursuance of Section 7, Sub-section 4, of the Patents and Designs Acts, 1907 and 1919, to specification 168,108.

225,393. SODA CRYSTALS, PRODUCTION OF. H. L. Kidd, 13, Sprowston Road, Forest Gate, London, E.7. Application date, December 17, 1923.

In this apparatus the production of soda crystals from soda ash is facilitated by passing an electric current through the saturated solution. The soda solution is formed from soda ash and water in tanks 1 mounted on a framework 2 adjacent to an inclined drying trough 3. This trough has a gauze floor and is arranged above a trough 4 inclined so that the mother liquor flows into the pipe 6, and so back to the storage tank 7. A hoisting gear 9 is provided for lifting the casks of soda ash to one or other of the tanks 1. An induction coil 11 supplies alternating current to galvanised iron hangers 15 depending from cross-bars 16. It is found that a much more rapid crystallisation takes place and that whiter crystals are obtained. It is important to prevent agitation of the liquor during crystallisation. The heat of solution of the soda ash is relied upon to increase the temperature of the liquor to obtain a solution from which crystals will deposit on cooling.



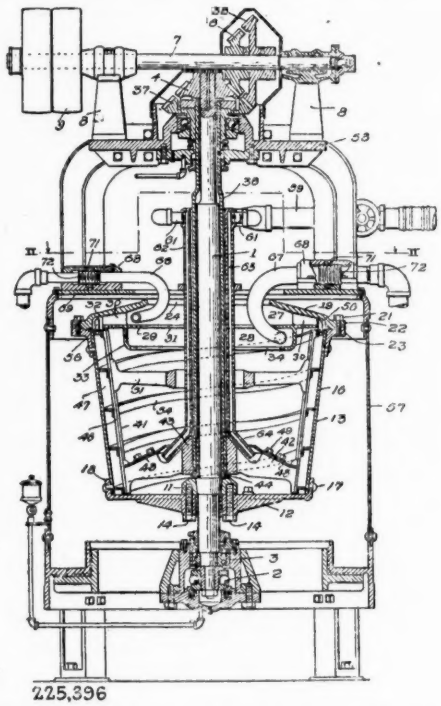
225,393

225,396. CENTRIFUGAL SEPARATOR. F. W. McEntire, Salt Lake City, Utah, U.S.A. Application date, December 18, 1923.

This apparatus is more particularly for separating solid matter suspended in liquid in cases where the difference in specific gravity is small—*e.g.*, in the treatment of the carbonated juice of sugar beet, and in separating or concentrating minerals. A vertical shaft 1 is supported on a ball-bearing 2, and carries a level wheel 4 driven by a similar wheel 6 on a driving shaft 7. The shaft 1 carries a basket 13 having a partial cover 19 with central opening 24. The cover 19 carries a structure 29 having central openings 31, 34. The shaft 1 is surrounded by a sleeve 36 carrying a bevel wheel 37 which is also driven by the shaft 7 through a bevel wheel 38. The gear ratios are chosen so that the sleeve 36 rotates at a slightly different speed from the shaft 1. The sleeve 36 carries a number of arms 42 supporting a basket 41 spaced slightly from the outer basket 13. The basket 41 carries a spiral guideway 54 leading to the annular passage 32 through which solids pass into the chamber 27.

The material to be separated is fed through a pipe 59 and sleeve 62 to a flaring portion 64 and thence to the bottom of the basket. As the basket and frame are rotated at slightly

different speeds, the solids on the basket wall are guided upwards by the spiral 54 into the chamber 27 from which they are collected and discharged by the pipe 66. The separated liquid passes upwards through the opening 34 to the chamber 28




from which it is discharged by the pipe 67. The machine is equally effective where the difference in density between solid and liquid is more pronounced.

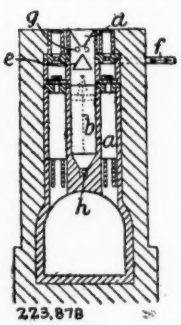
225,458. Electric Arc Furnaces. Soc. d'Etudes et de Constructions Metallurgiques, 64, Rue de la Boetie, Paris. International Convention date, December 17, 1923.

A screen or guard for electrodes of electric furnaces is composed of segments independent of one another, each having a heel engaging in a guiding groove in a register ring on the furnace. Asbestos or like material is coiled round the segments to make them air-tight when oscillated.

Note.—Abstracts of the following specifications, which are now accepted, appeared in The Chemical Age when they became open to inspection under the International Convention: 198,373 (J. N. A. Sauer), relating to treatment of liquids, see Vol. IX, p. 129; 207,555 (P. Pipereaut and A. Helbronner), relating to manufacture of titanic and zinc compounds, see Vol. X, p. 123; 217,546 (Deutsche Celluloid Fabrik), relating to recovery of nitric acid from weak nitric acid liquors, see Vol. XI, p. 174.

## International Specifications not yet Accepted

223,878. Destructive Distillation. F. Caspari, 93, Hohenzollernstrasse, Gelsenkirchen, Germany. International Convention date, October 24, 1923.




Coal dust or other bituminous material is fed from a hopper *d* over a distributor *e* into a space between a high tension electrode *b* and the hot walls *a* of the oven. The electric field causes the material to move in contrast with the hot walls. Coke is discharged by a conveyor *h*, and the distillate through a pipe *f*.

223,898. Splitting Fats. A. Welter, Dreiringwerke, Rheinhafen, Crefeld, Germany. International Convention date, October 23, 1923.

Coconut oil is split by treating in a copper autoclave at 6-7 atmospheres for 6-7 hours with water and zinc dust. After standing, the glycerine water and emulsified middle layer are removed and treated with caustic soda solution for 4-6 hours at 6-7 atmospheres. A yield of 99 per cent. is obtained.

223,911. Dyestuffs. Society of Chemical Industry in Basle, Switzerland. International Convention date, October 26, 1923. Addition to 205,525. (See The Chemical Age, Vol. IX, p. 580.)

Amino substituted *o*-benzoyl-benzoic acids are condensed with halogenated 1 : 3 : 5-triazine derivatives such as cyanuric chloride, and the anthraquinone ring closure then effected. The *o*-benzoyl-benzoic acids preferred are those which have an amino group in the *o* or *p*-position to that at which ring closure occurs. In one example, cyanuric chloride is condensed with 3 molecular proportions of $3^1$-aminobenzoyl-benzoic acid in presence of sodium carbonate and the product treated with concentrated sulphuric acid to obtain a yellow vat dye. Another example is given in which $2^1$ : $5^1$-diamino-benzoyl-benzoic acid is employed.

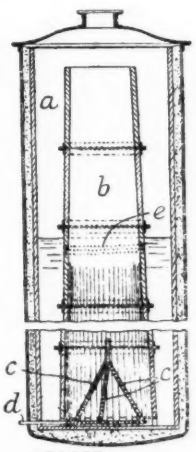
223,918. Hydrocyanic Acid. Deutsche Gold-und Silber-Scheideanstalt vorm. Roessler, Frankfurt-on-Main, Germany. International Convention date, December 2, 1922.

Hydrocyanic acid is produced from gaseous carbon and nitrogen compounds such as carbon monoxide and ammonia in the presence of a metal oxide catalyst which is wholly or partly unaffected by the gas mixture. The catalyst may be supported on pumice, asbestos, or charcoal. A reducible oxide such as iron oxide may be employed if a protecting substance such as alkali or alkaline earth oxide or alumina is added. The reaction is effected under pressure, and the product rapidly cooled by reductian of pressure.

223,919. Ammonia. Fabrique Nationale de Produits Chimiques et d'Explosifs-Anciens Etablissements Ghinigonet et Delattre Soc. Anon., Ougrée, Belgium. International Convention date, October 23, 1923.

Alkali and alkaline earth cyanamides are dry-distilled with cellulosic material to obtain ammonia. A cellulosic material such as peat, which contains nitrogen, may be impregnated with caustic soda or potash before mixing with the cyanamide. The residue of calcium carbonate and carbon can be used to produce more cyanamide. Other suitable cellulosic materials are sawdust, peat, lignite, beetroot pulp, spent tan bark, brewing residues, and oil cake.

224,199. Lead Acetate. R. Plaueln, 21, Biebererstrasse, Offenbach, Germany. International Convention date. October 30, 1923.




Metallic lead fibres are oxidised in acetic acid or lead acetate solution by injecting air and circulating the liquor. A cylindrical chamber *a* contains an open-ended tapered cylinder *b* in which the charge of lead is placed, and which contains a number of perforated screens *e* just below the liquid level. Air is supplied by a pipe *d* to a set of nozzles *c*, and blown up through the liquid so that it is carried over the top of the cylinder *b* into the annular space. In this apparatus it is possible to use lead containing antimony instead of refined lead.

224,223. Magnesium Sulphate. Soc. des Mines de Potasse d'Alsace, Amelie, Max, Joseph, Else, Théodore, Prince Eugene, Fernand (autrefois Reichsland), Anna, Marie, et Marie-Louise, Wittelsheim, Haut-Rhin, France. International Convention date, October 29, 1923.

An apparatus comprising a series of digesters is described in which a suspension of calcined dolomite and gypsum is treated with carbon dioxide, obtained by calcining the dolomite. Magnesium sulphate is obtained.

### Latest Notifications.

226,142. Process for the Purification of those Products in Industry which use Alcohol as a Solvent, and in Particular in the Cellulose Ester Industry. J. H. Brégeat. December 15, 1923.

226,143. Manufacture of Fuel Alcohol, and Apparatus Therefor. G. Henneberg and M. H. Charpentier. December 10, 1923.

226,147. Standpipes for the Discharge of Distillation Products from a Retort into a Collecting Main of a Carbonising Plant. Koppers Co. December 13, 1923.

226,161. Tar Distillation Apparatus. Sulzer Frères Soc. Anon. December 15, 1923.

226,180. Process of Separating a Mixture of Hafnium and Zirconium Compounds. Naamlooze Vennootschap Philips' Gloeilampenfabrieken. December 12, 1923.

226,188. Method of Purifying Oils. Schlesisches Kohlenforschungsinstitut der Kaiser-Wilhelm-Ges. December 11, 1923.

226,224. Art of Treating Synthesis Gases of Synthetic Ammonia Plants, and Apparatus therefor. Synthetic Ammonia and Nitrates, Ltd. December 13, 1923.

### Specifications Accepted with Date of Application

202,317. High boiling hydrocarbons into hydrocarbons of lower boiling points, Process for converting. H. R. Berry. August 10, 1922.

203,691. Furfural, Process of manufacturing. Quaker Oats Co. September 7, 1922.

208,689. Acetaldehyde, Manufacture of. Canadian Electro Products Co., Ltd. December 21, 1922.

211,828. Regeneratively-heated retort oven batteries. Koppers Co. February 23, 1923.

225,891. Liquids, Treatment of. H. E. Potts (*Naamlooze Vennootschap Algemeene Norit Maatschappij*). June 8, 1923.

225,893. Gas-filtering apparatus. F. H. Rogers. (*O. V. Greene.*) June 12, 1923.

225,944. Resinous compositions, British Thomson-Houston Co., Ltd. (*General Electric Co.*) September 13, 1923.

225,952. Separating-plant for separating or sorting finely divided material. B. F. Sexton and C. S. Messinger. September 15, 1923.

225,995. Peat, Apparatus for disintegrating and dehydrating. C. W. G. Clewlow. November 2, 1923. Addition to 183,566.

225,996. Insecticidal and fungicidal preparations. F. Howles and McDougall and Yalding, Ltd. November 2, 1923.

226,032. Bituminous emulsions. J. A. Montgomerie. December 8, 1923.

226,042. Hydrochloric acid and salt cake, Processes of making. C. A. Grasselli. December 27, 1923.

226,066. Chromates, Process of making—and apparatus therefor. W. Carpmael. (*National Electrolytic Co.*) February 15, 1924.

226,071. Artificial horn and artificial ivory (stone-nut substitute) from viscose, Process for making. P. Bader, H. Eggert, and A. Wagner. March 5, 1924.

226,102. Coke, Manufacture of. Berg-und Hüttenwerks Ges. March 17, 1924.

### Applications for Patents

(Algemeene Norit Maatschappij) and Potts, H. E. Production of active carbons. 30,191. December 16. (February 22.)

(Algemeene Norit Maatschappij). Production of active carbons. 30,192. December 16. (May 9.)

Bateman, H. E. G. Manufacture of crepe rubber. 30,256. December 16.

Bateman, L. C. Manufacture of crepe rubber. 30,256. December 16.

Besta, A. Low-temperature distillation of fuels. 30,606. December 19. (Germany, December 24, 1923.)

Blackburn, H. W. Manufacture of ammonia. 30,454. December 18.

Borax Consolidated, Ltd. Production of sodium pentaborate. 30,465. December 18.

British Dyestuffs Corporation, Ltd., Hollins, C., and Perkin, W. H. Manufacture of anthraquinone dyestuffs. 30,267. December 16.

British Dyestuffs Corporation, Ltd. Dyeing cellulose acetate, etc. 30,268. December 16.

British Dyestuffs Corporation, Ltd., Bunbury, H. M., and Perkin, W. H. Dyeing cellulose acetate, etc. 30,522. December 18.

British Dyestuffs Corporation, Ltd., and Robinson, R. Preparation of aminodian thrimides. 30,625. December 19.

Hirchberg, L. M. Production of light hydrocarbons from heavy hydrocarbons. 30,114. December 15.

Jacobsson, R. Production of alumina. 30,272. December 16.

K.D.P., Ltd. Manufacture of rubber. 30,566, 30,567. December 19.

Lamble, A., and United Alkali Co., Ltd. Bleaching powder. 30,108. December 15.

Marks, E. C. R., and Nitrogen Corporation. Production of sodium carbonate and nitrogen. 30,385. December 17.

Murphy, H. N. Preparation and use of lactates. 30,473. December 18.

Schmidt, F. Process for softening water. 30,488. December 18. (Germany, January 12.)

Shaw, H. S. Hele-. Edge filtration. 30,377. December 17.

Shaw, H. S. Hele-. Rotary filters. 30,618. December 19.

Thomas, W. Manufacture of ammonia. 30,454. December 18.

Thoumyre Fils and Thoumyre, M. Process for separating distillates in a chemical compound. 30,120. December 15.

Wallace, W. M. Recovery of soda from its solution. 30,531. December 18.

Wood, A. Manufacture of white lead. 30,653. December 20.

## Activated Carbon in Industry

(From a Correspondent.)

One of the most interesting industrial developments which received a great impetus in the war in connection with gas masks is the manufacture and application of activated carbon. As is well known this is a remarkable modification of carbon in which the properties of absorbing gases, de-colourising liquids, and promoting chemical reactions are increased to an enormous extent in comparison with bone black, hitherto the most active form known. Activated carbon is a form of carbon in which the pores are not only of incredible smallness in size as compared with bone black or other ordinary forms, but they have also entirely porous walls and are not clogged up with impurities, so that the chemical reactivity and "surface action" of the material is increased to an extraordinary degree.

According to one theory carbon exists in two entirely separate modifications, active and inactive, the proportions of which in any given carbon product are largely dependent on the temperature at which it has been formed. Thus ordinary charcoals or bone blacks mostly consist of the inactive form, but contain a certain proportion of the active variety, and one general method of preparation is to destroy as much as possible of the inactive form, and of the material already absorbed by the active form, which clogs it, so as to give a final product with a much higher percentage of re-active material.

It is interesting to note that Sutcliffe, Speakman and Co., Ltd., of Leigh, who supplied large quantities of activated carbon as an absorbent for gas masks during the war, manufacture this material according to the same general principle as their "Pure Coal Briquette" process for free burning smokeless fuel. Coal of the best quality, a very cheap product in comparison with the price of the much inferior bone charcoal, is pulverised extremely fine and made up into briquettes without the use of any binding material, by means of the new powerful "Sutcliffe" briquette press operating at 6–10 tons per square inch pressure. These "pure coal" briquettes are then carbonised by passing through them in a vertical retort a stream of highly heated steam and inert gases, giving a residual product with an excessively fine grained structure, which is then thoroughly washed and cleaned by special processes giving an activated carbon of very high grade properties. The exact method of manufacture is modified according to whether a carbon for gas absorption purposes or for decolourising liquids is required, whilst further modifications in the latter case depend upon the nature of the material to be decolourised.

The uses of activated carbon in industry are so numerous that it is quite impossible to give even a list of them, but one of the newer fields is the decolourisation of oils and fats, tallow, coconut oil, linseed oil, peanut and corn oil, cotton seed oil and castor oil, and also many chemicals in solution, such as cream of tartar, citric acid, lactic acid, alcohol, alkaloids, photographic reagents and intermediates for dyestuffs, whilst another very striking application is the extraction of gold from excessively dilute solutions in the cyanide process.

Another huge field for activated carbon is in the absorption of gases of every description, especially in connection with light oils from the gaseous and volatile products given off in the carbonisation of coal. In this process the gases are merely passed through a bed of activated charcoal, which absorbs the motor spirit instantly, and when the carbon is saturated, steam is blown through for a short period and all the spirit driven off in a very pure condition, when the material is ready for use again, thus doing away with a large amount of condensation and rectification plant, constituting a considerable development of the absorption properties of charcoal as represented by its use in sewer manholes.

# London Chemical Market

***The following notes on the London Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing those firms' independent and impartial opinions.***

*London, January* 1, 1925.

THE volume of business has naturally been of smaller proportions during the past week, and little active buying is likely to take place until stocktaking is over. Prices, however, are generally firmer, and the forward tendency is hopeful. Export inquiry is fairly active.

### General Chemicals

ACETONE continues in moderate request at recent values.

ACID ACETIC is in fair demand, 80% technical being £41 per ton, and 80% pure £43 per ton.

ACID CITRIC is without special feature.

ACID FORMIC is in good demand and is quoted at £52 to £53 per ton ex wharf.

ACID LACTIC isin fair request at about £43 per ton for 50% by weight.

ACID OXALIC is in good demand and the forward tendency is very firm indeed.

ACID TARTARIC is uninteresting.

ALUMINA SULPHATE.—Price seems to have touched bottom, makers are very reluctant to make any further concessions.

ARSENIC.—Foreign brands are decidedly firmer and a further improvement in price is looked for.

BARIUM CHLORIDE is in good demand at about £12 per ton.

COPPER SULPHATE.—Unchanged.

CREAM OF TARTAR is rather lower in price, being to-day about £78 per ton.

FORMALDEHYDE.—One can hardly conceive of lower prices and it is generally thought that any movement will be in the other direction.

EPSOM SALTS.—Unchanged.

LEAD ACETATE.—Higher prices, white being quoted at about £48 per ton and brown at £44 to £45 per ton.

LEAD NITRATE is a very firm market, and an advance in price is likely in sympathy with metal.

LIME ACETATE is quiet, price nominally about £14 per ton.

METHYL ALCOHOL is in slow demand, price about £52 per ton.

POTASSIUM CARBONATE AND CAUSTIC.—Both articles are firmly held, although demand remains nominal.

POTASSIUM PERMANGANATE.—The firmer tendency has been maintained. The advance in the market seems to have frightened the buyers for the moment.

POTASSIUM PRUSSIATE is very firm indeed, and is quoted at 7¾d. to 8d. per lb.

SODA ACETATE is in steady demand at £23 to £23 10s. per ton.

SODA BICHROMATE.—Contracts for the year are nearly all booked and business now is of the hand-to-mouth variety.

SODA HYPOSULPHITE is in ready demand at £9 10s. to £9 15s. per ton.

SODA NITRITE is well inquired for, price £24 to £24 10s. per ton.

SODA PRUSSIATE.—Firm at 4¾d. to 4½d. per lb., and a further advance is expected.

SODA SULPHIDE is a weak market, buyers are holding off wherever possible.

### Coal Tar Products

The firm tone of the market in coal tar products is maintained.

90% BENZOL is steady at 1s. 8½d. per gallon on rails.

PURE BENZOL is unchanged at 2s. per gallon on rails.

CREOSOTE OIL shows a further advance in price, and is quoted at 6d. to 6¼d. per gallon on rails in the North, while the price in London is from 6¼d. to 6½d. per gallon.

CRESYLIC ACID is quoted at 1s. 11d. to 2s. per gallon on rails for the pale quality 97/99%, while the dark quality, 95/97%, is quoted at 1s. 7d. to 1s. 8d. per gallon on rails.

SOLVENT NAPHTHA is firm at 1s. 4d. per gallon on rails.

HEAVY NAPHTHA remains at 1s. to 1s. 1d. per gallon on rails.

NAPHTHALENES are unchanged, the drained qualities being worth from £4 to £4 10s. per ton. The 76/78 quality is quoted at £6 to £6 10s. per ton, with 74/76 quality at £5 10s. to £6 per ton.

PITCH is quiet. Prices are unchanged at 50s. to 52s. 6d. per ton f.o.b. main ports.

## Nitrogen Products Market

EXPORT.—The demand from the Far East has continued during the last week and further sales have been made. The result of these sales has been the reduction of supplies available for delivery up to the end of May, and there is a distinctly firmer tone in the market. It is anticipated that the bulk of the supplies available will be disposed of at about £13 15s. per ton f.o.b. for January shipment, and £14 to £14 10s. per ton f.o.b. for later shipment. If the American demand matures, it is certain that these prices will be raised.

HOME TRADE.—Home sales have been made in normal quantities for this period of the year during the last week or two. It is anticipated that the buyers who have not already booked their quantities will buy for prompt delivery later. The producers have reserved large quantities to meet home requirements.

NITRATE OF SODA.—The nitrate of soda market continues quiet, and practically no sales have been reported by the Producers' Association. The business done is mostly for resale at the price of about £11 15s. per ton for prompt delivery, with slightly higher prices for early spring delivery.

### Canadian Bentonite

REPORT No. 626 of the Dominion Department of Mines at Ottawa is a survey of Canada's bentonite resources. Bentonite is a clay-like material found in Western Canada, which is now used in many industries. The report summarises all that has previously appeared on the subject and describes the physical and chemical properties of the clay together with suggestions for industrial uses. Samples of bentonite have been sent to the Imperial Mineral Resources Bureau and the Department of Scientific and Industrial Research in London for distribution to British manufacturers for experimental purposes.

## American Market Movements

(FROM *Drug and Chemical Markets.*)

ANOTHER quiet week experienced in heavy chemical market on sales for immediate delivery. Business for future delivery reported as satisfactory. Domestic copper sulphate in strong position. Bichromates shaded further. Glauber salt firmer. Sodium nitrate higher. Oxalic acid firm. Demand for intermediates remains quiet although contract business is rapidly being closed. Prices remain generally firm. Crudes show slight changes from last week. Benzene steady. Naphthalene firm. Phenol lower. Pyridine much weaker on spot. Solvent naphtha unchanged. Market remains firm in fixed oils owing to continued demand and shortage of available supplies. Chinawood maintains a strong position. Linseed oil sharply higher on spot and for future delivery. Cottonseed oil firm. Animal oils continue firm. Fish oils unchanged.

Fine chemicals are in active demand, although volume of business is not up to last week. Advance in mercury is the feature. Menthol is easier. Codliver oil is higher. Bromides are active.

### Fertiliser Analysis

MR. F. W. F. ARNAUD, F.I.C., official agricultural analyst for Kent, in his report for the quarter ending September 30, states that 367 samples of fertilisers were handled, 56 being pronounced unsatisfactory. Of these 367 samples 197 were sold at "unit value," and 19 without a guarantee. There were, therefore, 151 samples received with a guarantee, and of these 56 were unsatisfactory. Thus nearly 40 per cent. of the fertiliser samples sold with a guarantee were found to be of an unsatisfactory nature.

# Weekly Prices of British Chemical Products

*The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at retailers' works.*

## General Heavy Chemicals

Acid Acetic, 40% Tech.—£21 10s. per ton.

Acid Boric, Commercial.—Crystal, £22 to £24 per ton. Powder, £47 per ton.

Acid Hydrochloric.—3s. 9d. to 6s. per carboy d/d., according to purity, strength and locality.

Acid Nitric, 80° Tw.—£21 10s. to £27 per ton, makers' works, according to district and quality.

Acid Sulphuric.—Average National prices f.o r. makers' works, with slight variations up and down owing to local considerations: 140° Tw., Crude Acid, 65s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

Ammonia Alkali.—£6 15s. per ton f.o.r. Special terms for contracts.

Bleaching Powder.—Spot, £10 10s. d/d.; Contract, £10 d/d. 4 ton lots.

Bisulphite of Lime.—£7 10s. per ton, packages extra.

Borax, Commercial.—Crystal, £25 per ton. Powder, £26 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)

Calcium Chloride (Solid).—£5 12s. 6d. to £5 17s. 6d. per ton d/d, carriage paid.

Copper Sulphate.—£25 per ton.

Methylated Spirit 64 O.P.—Industrial, 2s. 7d. to 2s. 11d. per gall. Mineralised, 3s. 8d. to 4s. per gall., in each case according to quantity.

Nickel Sulphate.—£38 per ton d/d. Normal business.

Nickel Ammonia Sulphate.—£38 per ton d/d. Normal business.

Potash Caustic.—£30 to £33 per ton.

Potassium Bichromate.—5¾d. per lb.

Potassium Chlorate.—3d. to 4d. per lb.

Salammoniac.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton. Carr. pd.

Salt Cake.—£3 10s. per ton d/d. In bulk.

Soda Caustic, Solid.—Spot lots delivered, £15 12s. 6d. to £18 per ton, according to strength; 20s. less for contracts.

Soda Crystals.—£5 to £5 5s. per ton ex railway depots or ports.

Sodium Acetate 97/98%.—£24 per ton.

Sodium Bicarbonate.—£10 10s. per ton, carr. paid.

Sodium Bichromate.—4½d. per lb.

Sodium Bisulphite Powder 60/62%.—£17 to £18 per ton, according to quantity, f.o.b., 1-cwt. iron drums included.

Sodium Chlorate.—2¾d. to 3½d. per lb.

Sodium Nitrate refined 96%.—£13 5s. to £13 10s. per ton, ex Liverpool. Nominal.

Sodium Nitrite 100% basis.—£27 per ton d/d.

Sodium Sulphide conc. solid. 60/65.—About £15 per ton d/d. Contract £14 15s. Carr. pd.

Sodium Sulphide Crystals.—£9 5s. per ton d/d. Contract £9 2s. 6d. Carr. pd.

Sodium Sulphide, Pea Crystals.—£15 per ton f.o.r. London, 1-cwt. kegs included.

## Coal Tar Products

Acid Carbolic Crystals.—5¾d. per lb. Quiet. Crude 60's, 1s. 7d. to 1s. 9d. per gall. Market quiet.

Acid Cresylic 97/99.—1s. 11d. to 2s. per gall. Fair business. Pale, 95%, 1s. 7d. to 1s. 11d. per gall. Dark, 1s. 7d. to 1s. 9d. per gall. Market dull.

Anthracene Paste 40%.—4d. per unit per cwt.—Nominal price. No business.

Anthracene Oil, Strained.—6½d. to 7½d. per gall. Small demand. Unstrained, 6d. to 6½d. per gall.

Benzol.—Crude 65's.—9d. to 11½d. per gall., ex works in tank wagons. Standard Motor, 1s. 4½d. to 1s. 6d. per gall., ex works in tank wagons. Pure, 1s. 9½d. to 1s. 11d. per gall., ex works in tank wagons. Prices advanced. Supplies very scarce.

Toluol,—90%, 1s. 5½d. to 1s. 7d. per gall. More inquiry. Pure, 1s. 7d. to 1s. 9d. per gall. Steady demand.

Xylol Commercial.—2s. 3d. per gall. Pure, 3s. 3d. per gall.

Creosote.—Cresylic, 20/24%, 8¼d. to 8½d. per gall. Not much business. Middle Oil, Heavy, Standard specification, 5½d. to 6¼d. per gall., according to quality and district. Market firmer. Steady demand.

Naphtha.—Crude, 8d. to 9d. per gall. Solvent 90/160, 1s. 5d. to 1s. 7d. per gall. Demand good. Solvent 90/190, 1s. to 1s. 1d. per gall. Few inquiries.

Naphthalene Crude.—Demand rather better. Cheaper in Yorkshire than in Lancashire. Drained Creosote Salts, £3 to £5 per ton. Steady, but quiet. Whizzed or hot pressed, £6 to £9 per ton. No business.

Naphthalene.—Crystals and Flaked, £12 to £15 per ton, according to districts.

Pitch.—Medium soft, 45s. to 55s. per ton, according to district. Not much business.

Pyridine.—90/160, 18s. to 18s. 6d. per gall. Market dull. Few inquiries. Heavy, 11s. 6d. to 12s. Steady.

## Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated.

Acetic Anhydride 95%.—1s. 7d. per lb.

Acid H.—3s. 10d. per lb. 100% basis d/d.

Acid Naphthionic.—2s. 2d. per lb. 100% basis d/d.

Acid Neville and Winther.—5s. 8d. per lb. 100% basis d/d.

Acid Salicylic, technical.—1s. 1d. per lb. Good demand.

Acid Sulphanilic.—9d. per lb. 100% basis d/d.

Aluminium Chloride, anhydrous.—10d. per lb. d/d.

Aniline Oil.—8d. per lb. naked at works.

Aniline Salts.—8d. per lb. naked at works

Antimony Pentachloride.—1s. per lb. d/d.

Benzidine Base.—3s. 9d. per lb. 100% basis d/d.

Benzyl Chloride 95%.—1s. 1d. per lb.

*p*-Chlorphenol.—4s. 3d. per lb. d/d.

*p*-Chloraniline.—3s. per lb. 100% basis.

*o*-Cresol 29/31° C.—3½d. to 4½d. per lb. Easier.

*m*-Cresol 98/100%.—2s. 1d. to 2s. 3d. per lb. Demand moderate.

*p*-Cresol 32/34° C.—2s. 1d. to 2s. 3d. per lb. Demand moderate.

Dichloraniline.—2s. 3d. per lb.

Dichloraniline S. Acid.—2s. 3d. per lb. 100% basis.

*p*-Dichlorbenzol.—£85 per ton.

Diethylaniline.—4s. 3d. per lb. d/d., packages extra, returnable.

Dimethylaniline.—2s. 2½d. per lb. d/d. Drums extra.

Dinitrobenzene.—9d. per lb. naked at works.

Dinitrochlorbenzol.—£84 10s. per ton d/d.

Dinitrotoluene.—48/50° C. 8d. to 9d. per lb. naked at works. 66/68° C. 1s. 2d. per lb. naked at works.

Diphenylaniline.—2s. 10d. per lb. d/d.

G. Salt.—2s. 2d. per lb. 100% basis d/d.

Monochlorbenzol.—£63 per ton.

*a*-Naphthol.—2s. 4d. per lb. d/d.

*B*-Naphthol.—1s. per lb. d/d.

*a*-Naphthylamine.—1s. 3½d. per lb. d/d.

*B*-Naphthylamine.—4s. per lb. d/d.

*m*-Nitraniline.—4s. 2½d. per lb. d/d.

*p*-Nitraniline.—2s. 2½d. per lb. d/d.

Nitrobenzene.—5½d. to 5½d. per lb. naked at works.

*o*-Nitrochlorbenzol.—2s. 3d. per lb. 100% basis d/d.

Nitronapthalene.—10d. per lb. d/d.

*p*-Nitrophenol.—1s. 9d. per lb. 100% basis d/d.

*p*-Nitro-*o*-amido-phenol.—4s. 6d. per lb. 100% basis.

*m*-Phenylene Diamine.—4s. per lb. d/d.

*p*-Phenylene Diamine.—10s. per lb. 100% basis d/d.

R. Salt.—2s. 4d. per lb. 100% basis d/d.

Sodium Naphthionate.—2s. 2d. per lb. 100% basis d/d.

*o*-Toluidine.—10d. per lb.

*p*-Toluidine.—2s. 10d. per lb. naked at works.

*m*-Toluylene Diamine.—4s. per lb. d/d.

## Wood Distillation Products

There is a general feeling that the fall in price of acetates during the last few weeks has reached its limit. The tendency is now to stiffen again.

Acetate of Lime.—Brown £11 5s. per ton d/d and upward. Grey, £14 10s. to £15 10s. per ton. Firmer. Liquor, 9d. per gall. 32° Tw.

Charcoal.—£7 5s. to £9 per ton, according to grade and locality. Demand better in many localities.

Iron Liquor.—1s. 7d. per gall. 32° Tw. 1s. 2d. per gall. 24° Tw.

Red Liquor.—10d. to 1s. per gall. 14/15° Tw.

Wood Creosote.—2s. 9d. per gall. Unrefined.

Wood Naphtha, Miscible.—4s. 9d. per gall. 60% O.P. Solvent, 5s. to 5s. 3d. per gall. 40% O.P. Firmer.

Wood Tar.—£4 10s. to £5 10s. per ton. Demand slack and stocks being held.

Brown Sugar of Lead.—£42 per ton. Steady market.

## Rubber Chemicals

Antimony Sulphide.—Golden, 5¾d. to 1s. 4d. per lb., according to quality. Crimson, 1s. 4d. to 1s. 6d. per lb., according to quality.

Arsenic Sulphide, Yellow.—1s. 11d. per lb.

Barytes.—£3 10s. to £6 15s. per ton, according to quality.

Cadmium Sulphide.—3s. 9d. to 4s. 3d. per lb., according to quantity.

Carbon Bisulphide.—£30 to £33 per ton, according to quantity.

Carbon Black.—6d. to 6½d. per lb., ex wharf.

Carbon Tetrachloride.—£62 10s. to £67 10s. per ton, according to quantity drums extra.

Chromium Oxide, Green.—1s. 3d. per lb.

Indiarubber Substitutes, White and Dark.—5d. to 9½d. per lb. Demand very brisk. Prices likely to remain steady owing to firmness of rapeseed oils.

Lamp Black.—£48 per ton, barrels free.

Lead Hyposulphite.—7½d. per lb.

Lithopone, 30%.—£22 10s. per ton.

Mineral Rubber " Rubpron."—£16 5s. per ton f.o.r. London.
Sulphur.—£10 to £12 per ton, according to quality.
Sulphur Chloride.—4d. per lb., carboys extra.
Sulphur Precip. B.P.—£56 to £65 per ton.
Thiocarbanilide.—2s. 6d. per lb.
Vermilion, Pale or Deep.—5s per lb. Dearer.
Zinc Sulphide.—7½d. to 1s. 8d. per lb., according to quality.

### Pharmaceutical and Photographic Chemicals

Acid, Acetic 80% B.P.—£45 per ton ex wharf London in glass containers.
Acid, Acetyl Salicylic.—3s. to 3s. 2d. per lb., according to quantity. Sales steady. Price firm.
Acid, Benzoic B.P.—2s. 6d. per lb.
Acid, Boric B.P.—Crystal £51 per ton, Powder £55 per ton. Carriage paid any station in Great Britain.
Acid, Camphoric.—19s. to 21s. per lb.
Acid, Citric.—1s. 4½d. to 1s. 5d. per lb., less 5% for ton lots. Increased demand.
Acid, Gallic.—2s. 9d. per lb. for pure crystal, in cwt. lots. Easier.
Acid, Pyrogallic, Crystals.—7s. per lb. for 1 cwt. lots. Resublimed quality 8s. per lb. Market firm.
Acid, Salicylic.—1s. 6d. to 1s. 8d. per lb., according to quantity.
Acid, Tannic B.P.—2s. 10d. per lb. Quiet steady demand.
Acid, Tartaric.—1s. 1d. per lb., less 5%.
Amidol.—9s. per lb., d/d.
Acetanilide.—1s. 10d. to 2s. per lb. More inquiry.
Amidopyrin.—14s. 6d. per lb. for spot stocks.
Ammonium Benzoate.—3s. 3d. to 3s. 9d. per lb., according to quantity.
Ammonium Carbonate B.P.—£37 per ton.
Atropine Sulphate.—12s. 6d. per oz. for English make.
Barbitone.—13s. 9d. per lb. Slightly lower. Quiet steady demand.
Benzonaphthol.—5s. 3d. per lb. spot.
Bismuth Salts.—Prices reduced by about 1s. 3d. to 2s. 3d. per lb. on account of the fall in the price of the metal.
Bismuth Carbonate.—7s. 8d. to 9s. 8d. per lb.
Bismuth Citrate.—8s. to 10s. per lb.
Bismuth Salicylate.—7s. 5d. to 9s. 5d. per lb.
Bismuth Subnitrate.—6s. 10d. to 8s. 10d. per lb. according to quantity. Prices again reduced.
Borax B.P.—Crystal £29, Powder £30 per ton. Carriage paid any station in Great Britain.
Bromides.—Potassium, 1s. 10d. per lb.; sodium, 1s. 11d. per lb.; ammonium, 2s. 1d. per lb. Market less firm. Prices uncertain.
Calcium Lactate.—1s. 6d. to 1s. 8d., according to quantity. Fair demand and steady market.
Chloral Hydrate.—4s. per lb.
Chloroform.—2s. 6d. per lb. for cwt. lots.
Creosote Carbonate.—6s. 6d. per lb. Little demand.
Formaldehyde.—£48 to £49 per ton, in barrels ex wharf London. Supplies exceed demand.
Glycerophosphates.—Fair business passing. Calcium, soluble and citrate free, 7s. per lb.; iron, 8s. 9d. per lb.; magnesium, 9s. per lb.; potassium, 50%, 3s. 6d. per lb.; sodium, 50%, 2s. 6d. per lb.
Guaiacol Carbonate.—9s. per lb. Reduced in price.
Hexamine.—3s. per lb. For bold crystal. Powder slightly less.
Homatropine Hydrobromide.—25s. to 30s. per oz.
Hydrastine Hydrochloride.—English make offered at 120s per oz.
Hydroquinone.—4s. 3d. per lb. in cwt. lots. Foreign make.
Hypophosphites.—Calcium, 3s. 6d. per lb., for 28 lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.
Iron Ammonium Citrate B.P.—1s. 11d. to 2s. 3d. per lb. Prices recently reduced.
Magnesium Carbonate.—Light Commercial, £36 per ton net. Light pure, £46 per ton.
Magnesium Oxide.—Light Commercial, £75 per ton, less 2½%; Heavy Commercial, £25 per ton, less 2½%; Heavy Pure, 2s. to 2s. 3d. per lb., according to quantity. Steady market.
Menthol.—A.B.R. recrystallised B.P., 55s. per lb., Synthetic, 26s. to 35s. per lb. according to quality. English make. Increasing demand.
Mercurials.—Market very quiet. Red oxide, 5s. 2d. to 5s. 4d. per lb.; Corrosive sublimate, 3s. 5d. to 3s. 7d. per lb.; white precipitate, 4s. 6d. to 4s. 8d. per lb.; Calomel, 3s. 10d. to 4s. per lb.
Methyl Salicylate.—1s. 9d. to 2s. per lb.
Methyl Sulphonel.—22s. per lb. Slightly weaker.
Metol.—11s. per lb. British make.
Morphine and Salts.—Reduced by 1s. to 1s. 3d. per oz.
Paraformaldehyde.—2s. 8d. for B.P. quality.
Paraldehyde.—1s. 2d. to 1s. 6d. per lb., in free bottles and cases.
Phenacetin.—5s. 6d. per lb.
Phenazone.—7s. per lb.
Phenolphthalein.—5s. 3d. per lb. for cwt. lots.
Potassium Bitartrate 99/100% (Cream of Tartar).—86s. per cwt., less 2½% for ton lots.
Potassium Citrate.—1s. 10d. to 2s. 2d. per lb.
Potassium Ferricyanide.—1s. 9d. per lb. Quiet.
Potassium Iodide.—16s. 8d. to 17s. 5d. per lb., according to quantity Steady market.
Potassium Metabisulphite.—7½d. per lb., 1-cwt. kegs included, f.o.r. London.
Potassium Permanganate.—B.P. crystals, 7½d. per lb., carriage paid; commercial, 8d. to 8¼d. per lb., carriage paid. Forward prices higher.
Quinine Sulphate.—2s. 3d. to 2s. 4d. per oz., in 100 oz. tins. Steady market.
Resorcin.—5s. per lb. In fair quantities. Supplies exceed demand.
Saccharin.—63s. per lb. in 50-lb. lots.
Salol.—3s. 6d. per lb., for cwt. lots. Slightly dearer.
Silver Proteinate.—9s. per lb. for satisfactory product light in colour.
Sodium Benzoate, B.P.—2s. 6d. per lb. Supplies of good quality available.
Sodium Citrate, B.P.C., 1923.—1s. 11d. to 2s. 2d. per lb., according to quantity.
Sodium Hypophosphite, Photographic.—£13 to £15 per ton, according to quantity, d/d consignee's station in 1-cwt. kegs.
Sodium Metabisulphite Crystals.—37s. 6d. to 60s. per cwt., net cash, according to quantity.
Sodium Nitroprusside.—16s. per lb.
Sodium Potassium Tartrate (Rochelle Salt).—75s. per cwt., and upwards.
Sodium Salicylate. Powder, 2s. 1d. to 2s. 3d. per lb. Crystal, 2s. 2d. to 2s. 4d. per lb. Flake, 2s. 6d. per lb. Strong demand, market firmer.
Sodium Sulphide, pure recrystallised.—10d. to 1s. 2d. per lb.
Sodium Sulphite, anhydrous, £27 10s. per ton, minimum 5 ton lots, according to quantity; 1 cwt. kegs included.
Sulphonal.—14s. 6d. per lb. Little demand.
Thymol.—18s. per lb. Firmer market.

### Perfumery Chemicals

Acetophenone.—11s. per lb.
Aubepine.—12s. 6d. per lb.
Amyl Acetate.—3s. per lb.
Amyl Butyrate.—6s. 6d. per lb.
Amyl Salicylate.—3s. 3d. per lb.
Anethol (M.P. 21/22° C.).—4s. 6d. per lb.
Benzyl Acetate from Chlorine-free Benzyl Alcohol.—2s. 9d. per lb.
Benzyl Alcohol free from Chlorine.—2s. 9d. per lb.
Benzaldehyde free from Chlorine.—2s. 9d. per lb.
Benzyl Benzoate.—3s. 6d. per lb.
Cinnamic Aldehyde Natural.—18s. 6d. per lb.
Coumarin.—17s. per lb. Again cheaper.
Citronellol.—20s. per lb.
Citral.—9s. per lb.
Ethyl Cinnamate.—12s. 6d. per lb.
Ethyl Phthalate.—3s. per lb.
Eugenol.—10s. 6d. per lb.
Geraniol. (Palmarosa).—33s. 6d. per lb.
Geraniol.—12s. 6d. to 20s. per lb.
Heliotropine.—6s. 9d. per lb.
Iso Eugenol.—16s. per lb.
Linalol ex Bois de Rose.—26s. per lb.
Linalyl Acetate.—26s. per lb.
Methyl Anthranilate.—10s. per lb.
Methyl Benzoate.—5s. per lb.
Musk Ambrette.—50s. per lb.
Musk Xylol.—14s. per lb.
Nerolin.—4s. 6d. per lb.
Phenyl Ethyl Acetate.—15s. 6d. per lb.
Phenyl Ethyl Alcohol.—15s. 3d. per lb.
Rhodinol.—50s. per lb.
Safrol.—1s. 10d. per lb.
Terpineol.—2s. 4d. per lb.
Vanillin.—25s. to 25s. 6d. per lb.

### Essential Oils

Almond Oil, Foreign S.P.A.—15s. 6d. per lb.
Anise Oil.—2s. 10d. per lb.
Bergamot Oil.—15s. per lb.
Bourbon Geranium Oil.—30s. per lb.
Camphor Oil.—65s. per cwt.
Cananga Oil, Java.—11s. 3d. per lb.
Cinnamon Oil, Leaf.—6½d. per oz.
Cassia Oil, 80/85%.—9s. per lb.
Citronella Oil.—Java, 85/90%, 7s. per lb. Ceylon, 3s. 4d. per lb.
Clove Oil.—8s. 3d. per lb.
Eucalyptus Oil, 70/75%.—2s. 1d. per lb.
Lavender Oil.—French 38/40% Esters, 35s. per lb.
Lemon Oil.—3s. 4d. per lb.
Lemongrass Oil.—5s. 9d. per lb.
Orange Oil, Sweet.—11s. per lb.
Otto of Rose Oil.—Bulgarian, 42s. 6d. per oz. Anatolian, 28s. per oz.
Palma Rosa Oil.—17s. per lb.
Peppermint Oil.—Wayne County, 45s. per lb. Japanese, 23s. 6d. per lb.
Petitgrain Oil.—9s. 9d. per lb.
Sandal Wood Oil.—Mysore, 26s. 7d. per lb. Australian, 18s. 6d. per lb.

# Scottish Chemical Market

*The following notes on the Scottish Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

*Glasgow, January* 1, 1925.

SINCE our report a fortnight ago there has been quite considerable activity in the Heavy Chemical Market, and although it may seem too soon to be optimistic, there are indications that the hoped-for improvement in trade generally may make itself felt in the chemical industry early in this year.

### Industrial Chemicals

ACID ACETIC.—In moderate demand and prices steady. Glacial 98/100%, £57 to £68 per ton, according to quality and packing; 80% pure quoted £43 to £45 per ton; 80% technical, £42 to £44 per ton, packed in casks, delivered c.i.f. U.K. port, duty free.

ACID BORACIC.—Remains unchanged. Crystal or granulated, £45 per ton; powdered, £47 per ton, carriage paid U.K. stations, minimum ton lots.

ACID CARBOLIC, ICE CRYSTALS.—Rather better inquiry. Now quoted 5½d. per lb. delivered.

ACID CITRIC, B.P. CRYSTALS.—Unchanged at about 1s. 4½d. per lb., less 5% ex store. Offered for prompt shipment from the Continent at 1s. 4¼d. per lb., less 5% ex wharf.

ACID FORMIC, 85%.—On offer at £50 per ton c.i.f. U.K. ports, duty free. Spot lots quoted £53 to £54 per ton ex store.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy, ex works.

ACID NITRIC, 80°.—£23 10s. per ton, ex station, full truck loads.

ACID OXALIC, 98/100%.—Moderate inquiry. Spot lots quoted about 3¾d. per lb., ex store. On offer from the continent at 3½d. per lb., ex wharf.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality, 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—Rather better inquiry. Now quoted 11¾d., less 5% ex store. Offered for forward delivery at slightly less.

ALUMINA SULPHATE, 17/18% IRON FREE.—On offer at £6 15s. per ton, c.i.f. U.K. port. Prompt shipment. Spot lots available at about £7 10s. per ton, ex store.

ALUM.—Lump potash alum quoted £9 15s. per ton, ex store, spot delivery. Offered from the continent at about £8 15s. per ton, ex wharf. Ammonium chrome alum of British manufacture quoted £17 per ton, f.o.b. U.K. port.

AMMONIA ANHYDROUS.—Unchanged at about 1s. 6d. per lb., ex station. Containers extra and returnable, with possible slight reduction for large quantities.

AMMONIA CARBONATE.—Lump, £37 per ton; powdered, £39 per ton, packed in 5 cwt. casks, delivered U.K. port.

AMMONIA LIQUID, 880°.—In steady demand. Unchanged at 2½d. to 3d. per lb., delivered, according to quantity, containers extra.

AMMONIA MURIATE.—Grey galvanisers' crystals of English manufacture quoted £30 per ton in casks, £29 per ton in bags, carriage paid station. On offer from the continent at about £27 per ton, c.i.f. U.K. port. Fine white crystals offered from the continent at about £24 10s. per ton, c.i.f. U.K. port.

ARSENIC, WHITE POWDERED.—In rather better demand. Offered for prompt despatch from works at about £36 5s. per ton, ex wharf. Spot lots quoted £37 per ton, ex store.

BARIUM CARBONATE, 98/100%.—Offered from the continent at about £9 10s. per ton, c.i.f. U.K. port.

BARIUM CHLORIDE, 98/100%.—Spot material now on offer at £12 5s. per ton ex store; 93/95% quality offered from the continent at £9 10s. per ton, c.i.f. U.K. port.

BARYTES.—English material unchanged at £5 5s. per ton, ex works. Continental quoted £5 per ton, c.i.f. U.K. port.

BLEACHING POWDER.—Spot lots, £10 10s. per ton, ex station. Contracts 20s. per ton less.

BORAX.—Granulated, £24 10s. per ton; crystals, £25 per ton; powdered, £26 per ton, carriage paid U.K. stations, minimum ton lots.

CALCIUM.—Price for English material unchanged at £5 12s. 6d. per ton ex station. Continental on offer at about £4 15s. per ton, c.i.f. U.K. port.

COPPERAS, GREEN.—Unchanged at about £3 5s. per ton, ex works, packed in casks, free.

COPPER SULPHATE.—In little demand. British material for export quoted at about £24 10s. per ton, f.o.b. U.K. port. Continental available on spot at about £23 10s. per ton, ex store.

FORMALDEHYDE, 40%.—Nominally £48 per ton, ex store, spot delivery. In little demand.

GLAUBER SALTS.—White crystals of English manufacture quoted £4 per ton, ex store or station.

LEAD, RED.—Imported material further advanced to about £47 per ton, ex store.

LEAD, WHITE.—Also advanced to about £48 15s. per ton, ex store.

LEAD ACETATE.—White crystals now quoted £48 5s. per ton, ex store, spot delivery. Brown about £47 per ton.

MAGNESITE, CALCINED.—Unchanged at about £7 17s. 6d. per ton, ex station, prompt delivery. Hard burnt quality quoted £4 15s. per ton, ex station. Finer quality of continental manufacture quoted £7 15s. per ton, c.i.f. U.K. port.

MAGNESIUM CHLORIDE.—Rather cheaper quotations from the continent, now quoted £4 12s. 6d. per ton, c.i.f. U.K. port.

POTASH CAUSTIC, 88/92%.—Unchanged at about £31 per ton, ex wharf, prompt shipment from the continent.

POTASSIUM BICHROMATE.—Quoted 5d. per lb. delivered.

POTASSIUM CARBONATE, 96/98%.—Offered from the continent at about £23 7s. 6d. per ton, c.i.f. U.K. port. Spot material quoted £25 per ton, ex store.

POTASSIUM CHLORATE.—Quoted 2⅝d. per lb., c.i.f. U.K. port prompt shipment. Spot lots available at about 2⅞d. per lb. ex wharf.

POTASSIUM NITRATE (SALTPETRE).—Quoted £26 per ton, c.i.f. U.K, port, prompt shipment from the continent. Spot lots on offer at £28 15s. per ton, ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Rather dearer at about 8½d. per lb. ex store, spot delivery. Offered from the continent at about 8¼d. per lb. ex wharf,

POTASSIUM PRUSSIATE, YELLOW.—In moderate demand and price unchanged at about 7½d. per lb. ex store. The same price is quoted for forward delivery.

SODA CAUSTIC.—76/77%, £18 per ton; 70/72%, £16 2s. 6d. per ton; broken, 60%, £17 2s. 6d. per ton; powdered, 98/99%, £21 7s. 6d. per ton, all carriage paid U.K. stations, spot delivery. Contracts 20s. per ton less.

SODIUM ACETATE.—In little demand and price unchanged at about £23 7s. 6d. per ton ex store. Offered from the continent at £22 10s. per ton c.i.f. U.K. port.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton ex quay or station; M.W. quality, 30s. per ton less.

SODIUM BICHROMATE.—Quoted 4d. per lb. delivered.

SODIUM CARBONATE.—Soda crystals, £5 to £5 5s. per ton ex quay or station; powdered or pea quality, £1 7s. 6d. per ton more; alkali 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—English material unchanged at £10 per ton ex station. Continental quoted £8 5s. per ton c.i.f. U.K. port. Spot lots available at about £9 10s. per ton ex store. Pea crystals of English manufacture quoted £13 15s. per ton ex station.

SODIUM NITRATE.—Ordinary quality quoted £13 17s. 6d. per ton ex store; 96/98%, refined quality, 7s. 6d. per ton extra.

SODIUM NITRITE, 100%.—In little demand. Nominally £25 per ton, but could probably be obtained for less.

SODIUM PRUSSIATE, YELLOW.—Spot material now quoted 4½d. per lb. ex store. Offered for prompt shipment from the continent at about 4d. per lb. c.i.f. U.K. port.

SODIUM SULPHATE, SALTCAKE.—Price for home consumption £3 10s. per ton f.o.r. works. Good inquiry for export and higher prices obtainable.

SODIUM SULPHIDE.—English manufacturers quote: 60/65% solid, £15 per ton; broken, £1 per ton more; flake, £2 per ton more; crystals, 31/34%, £9 5s. per ton, carriage paid U.K. stations, minimum four ton lots, with a slight reduction for contracts over a period. Solid 60/62%, offered from the continent at about £12 per ton c.i.f. U.K. port; 30/32% crystals at about £8 10s. per ton c.i.f. U.K. port.

SULPHUR.—Flowers, £9 10s. per ton; roll, £8 10s. per ton; rock, £8 7s. 6d. per ton; ground, £8 5s. per ton. Ex store. Prices nominal.

ZINC CHLORIDE 96/98%.—Continental manufacture quoted £23 per ton c.i.f. U.K. port. English material for export on offer at about £25 to £26 per ton f.o.b. U.K. port.

ZINC SULPHATE.—Unchanged at £12 15s. per ton, ex store, spot delivery.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

### Coal Tar Intermediates and Wood Distillation Products

BENZOLE 90%.—Price firm at 2s. per gallon delivered in drums.

BETA NAPHTHOL.—Price firm at 1s. per lb. delivered.

CROCEINE ACID.—Some export inquiry. Price 2s, 5½d. per lb. f.o.b.

DIANISIDINE.—Some export inquiry. Price 14s. per lb. 100% basis.

G ACID.—Export inquiry. Price 3s. lb. 100% basis.

META PHENYLENE DIAMINE.—Moderate export inquiry. Price 4s. per lb., f.o.b.

META NITRO PARATOLUIDINE.—8s. 2d. lb., 100% basis.
NEVILLE WINTHER ACID.—Export inquiry. Price 5s. 8d. lb., 100% basis, f.o.b.
ORTHO ANISIDINE.—Small export inquiry. Price 10s. 6d. per lb., f.o.b.
PARANITRANILINE.—Some export inquiry. Price 2s. lb. f.o.b.
SOLVENT NAPHTHA.—Market is very firm. Price 1s. 6d. per gallon in drums ex works.
TOLIDINE BASE.—Export inquiry. Price 6s. 10d. lb., f.o.b.

# Company News

YORKSHIRE DYEWARE AND CHEMICAL CO.—An interim dividend at the rate of 5 per cent. per annum is announced.

RECKITT AND SONS.—The directors have declared an interim dividend of 9d. per share for the quarter ending December 31. A year ago 8d. per share was paid.

ALLEN-LIVERSIDGE, LTD.—An interim dividend on account of the six months ended October 31 last, at the rate of 10 per cent. per annum (5 per cent. actual) has been declared by the directors.

NATIONAL FUEL OIL.—The trading accounts for the year ending October last show a profit of £7,904. Debenture interest paid and accrued amounts to £1,043, and the net balance on the year is £6,992, which it is proposed to carry forward.

NEW TRANSVAAL CHEMICAL CO.—Final dividends are announced for the year ended June 30 last, at the rate of 3 per cent. less income tax, on the cumulative first preference shares, and of 4 per cent., less income tax, on the cumulative "A" preference shares.

HUELVA COPPER AND SULPHUR MINES.—The report for the year ended June 30, 1924, states that the output of copper was the largest in the history of the company, notwithstanding that there was a reduction of 3,300 tons in ore mined. The mining profit was £66,377, as against £51,084 in 1922-23. The directors have written off for depreciation of buildings, machinery and plant and development £31,290, leaving £35,087. General expenses and corporation tax absorbed £5,867, and loss on exchange £16,765, leaving £12,454, plus £1,023 brought in, making £13,478. The directors recommend a dividend of 8d. per share (same as previous year), carrying forward £4,156.

MAJOR AND CO.—The report for the 15 months ending March 31 last states that the balance of profit and loss appropriation account brought forward was £2,443, to which is added for the 15 months ending March 31 a balance of £35,144. Out of this the following dividends have been paid: 6 per cent. on the 6 per cent. cumulative preference for the fifteen months to March 31; 8½ per cent. on the 8½ per cent. cumulative preference; 3½ per cent. interim dividend on preferred ordinary. The directors recommend a final dividend of 5¼ per cent. be paid on the preferred ordinary shares, making 8¾ per cent. for the fifteen months; leaving to be carried forward, £9,650. The directors regret they do not see their way to recommend payment of a dividend on the ordinary shares. Reserves have been increased by £39,620.

LOW TEMPERATURE CARBONISATION, LTD.—At the annual meeting, held in London on Wednesday, Lt.-Col. N. G. Thwaites presided, and asked the shareholders to consent to an adjournment of the meeting until an early date. At the moment important negotiations were about to be concluded, and any premature announcement would be unwise. With regard to the tests made at the Barnsley plant by H.M. Fuel Research Board, those had been of a highly satisfactory nature. The conclusions arrived at completely corroborated the technical claims made by the company in the treatment of coal. Of the commercial possibilities, the Government experts refrained from saying anything, but the balance-sheet, based upon actual results obtained at Barnsley, supplied final proof of the commercial and financial success of the process. To extend the plant at Barugh, Barnsley, the Yorkshire Coal Products, Ltd., had been formed, and that company would acquire the whole of the rights of Yorkshire, and take over the Barnsley works.

The Nottingham scheme had developed into a project considerably more advantageous to the company than the first contract made indicated, and the widespread interest among coal-owners showed that much of the old prejudice against new methods was dying out. He was convinced that the low temperature carbonisation of coal was an absolute national necessity, and public opinion seemed to have crystallised itself into a demand for that reform. The resolution for the adjournment of the meeting was unanimously approved.

SULPHIDE CORPORATION, LTD.—The annual general meeting was held in London on December 23. The chairman, in moving the adoption of the report, said that when they met in December last they had before them the accounts of a very satisfactory and prosperous year. In the previous July they had paid an interim dividend of 10 per cent. on both classes of their shares, and their cash position was so strong that in ordinary circumstances they should not have hesitated to recommend a final dividend of at least another 10 per cent. At the very outset, however, of the new financial year—only ten days after it commenced—a very serious and unexpected disaster had befallen them, and by the outbreak of fire at the Central Mine not only had they been deprived of their main source of revenue, but, owing to the expenditure necessary to combat the fire, a great drain upon their resources had commenced, which, as mentioned at the last meeting, had then already reached more than £100,000. In consequence of that misfortune, they had to conserve their cash resources to an extent which otherwise would have been unnecessary, and they distributed as their final dividend only 5 per cent., which was paid in January last. This year, from the same cause, they were compelled to pass their dividends altogether, and, considering that the fire had continued throughout the year, not only depriving them of revenue from their mine, but involving the enormous outlay of nearly £200,000 in fighting the fire, they might, he thought, congratulate themselves that the position disclosed by their present accounts was not worse than it was.

They had experienced, he added, at Broken Hill, the most anxious and difficult year in their history, but he felt confident that in the current year, unless their work was stopped by industrial troubles, a contingency they always had to bear in mind at Broken Hill, they should show considerably better results than they were able to do last year, and their earnings from the mining side of their business during the coming half-year would be substantially higher than thei outgoings, even inclusive of all fire-fighting and reopening expenditure.

# New Chemical Trade Marks

## Applications for Registration

*This list has been specially compiled for us by Mr. H. T. P. Gee, Patent and Trade Mark Agent, Staple House, 51 and 52, Chancery Lane, London, W.C.2, from whom further information may be obtained and to whom we have arranged to refer any inquiries relating to Patents, Trade Marks and Designs.*

*Opposition to the Registration of the following Trade Marks can be lodged up to January 24, 1925.*

"AMOA."

B451,126. For emulsifying liquids, being chemical substances for use in manufactures. Class 1. Amoa Chemical Co., 9, Marvels Lane, Grove Park, London, S.E.12; manufacturers. August 18, 1924. User claimed from May 22, 1922.

"SOLEDON."

453,899. For dyes and dyestuffs. Class 1. Scottish Dyes, Ltd., Earls Road, Grangemouth; dye manufacturers. November 24, 1924.

## New Year's Honours

THE list of New Year's Honours announced on Thursday includes a knighthood for Professor Rowland Harry Biffen, F.R.S., Professor of Agricultural Botany, Cambridge; Professor Frederick Gowland Hopkins, D.Sc., F.R.S., Professor of Bio-Chemistry, Cambridge; and Mr. William Bate Hardy, F.R.S., secretary of the Royal Society. The Order of Merit is conferred on Sir Ernest Rutherford, F.R.S., Cavendish Professor of Experimental Physics and Director of the Cavendish Laboratory, Cambridge.

# Commercial Intelligence

*The following are taken from printed reports, but we cannot be responsible for any errors that may occur.*

## Mortgages and Charges

[*NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

ELSTREE BLEACHING AND DYEING CO., LTD. (M., 3/1/25.) Registered December 5, £3,600 mortgage, to B. Laporte, Ltd., Kingsway, Luton; charged on Bleach Works, Boreham Wood; also registered December 8, charge to bank; charged on Bleach Works, Boreham Wood.

NATIONAL DRY CLEANERS, LTD., London, W. (M., 3/1/25.) Registered December 9, £2,000 debentures; general charge. *——. October 3, 1923.

PASTEX DYES, LTD., London. N. (M., 3/1/25.) Registered December 15, £600 debenture, to H. E. Chapman and another, 38, Holborn Viaduct, E.C., accounts; general charge. *£1,600 debentures. December 31, 1923.

SPEDOL MANUFACTURING CO., LTD., Brentford, paint manufacturers. (M., 3/1/25.) Registered December 11, Order of Court dated December 4, 1924, amending particulars filed August 6, 1924, to £5,000 2nd debentures (filed under sec. 93 (3) of the Companies (Consolidation) Act, 1908), present issue £1,250; also registered December 11, £1,200 and £600, part of £5,000; general charge. *£8,050. November 27, 1924.

TAYLORS' DRUG STORES, LTD., Leeds. (M., 3/1/25.) Registered December 13, £4,500 mortgage, to A. B. Wilson, Hutton Rudby; charged on 134, High Street, Stockton-on-Tees. *£111,744 os. 11d. September 12, 1924.

### Satisfactions

MARLEY HILL CHEMICAL CO., LTD. (M.S., 3/1/25.) Satisfaction registered December 12, £4,000, balance of amount registered February 24, 1922.

PASTEX DYES, LTD., London, N. (M.S., 3/1/25.) Satisfaction registered December 12, £450, registered February 1st, 1924.

PEARCE (E. J.) AND CO., LTD., Newcastle-on-Tyne, paint manufacturers. (M.S., 3/1/25.) Satisfaction registered December 15, all moneys, etc., registered March 24, 1924.

SHERWOOD BLEACHING, DYEING AND DRESSING CO., LTD. (M.S., 3/1/25.) Satisfaction registered December 12, £8,000, registered April 30, 1909.

### Company Winding Up Voluntarily

HOLDERS (LONDON), LTD. (C.W.U.V., 3/1/25.) W. B Pearson, corporate accountant, 5, John Street, Bedford Row London, W.C.1, appointed liquidator, December 19. Meeting of creditors at the offices of the liquidator, on Thursday, January 8, at 12 noon. Creditors' claims by February 28.

## Bill of Sale

MOTTERSHEAD, Thomas Henry, 82, Tootal Drive, Weaste, chemical merchant. (B.S., 3/1/25.) Filed December 19. £90.

## New Companies Registered

ANGLO GALVANISING COMPANY (PLAISTOW), LTD., Abbey House, Victoria Street, London, S.W.1. To carry on the business of Galvanisers and any business relating to the galvanisation of metals, and metallic goods or products; manufacturers of and dealers in chemical solutions or preparations, manufacturing chemists, etc. Nominal capital, £1,000 in £1 shares.

ASSOCIATED LEAD MANUFACTURERS' EXPORT CO., LTD., Milburn House, Newcastle-on-Tyne Buyers, sellers and exporters to all parts of the world, of lead, copper, zinc, spelter and antimony, and in particular white lead, red lead, litharge, chemicals and chemical substances, paint, colours and varnishes, etc. Nominal capital, £1,000 in £1 shares.

BIRMINGHAM CHEMICAL CO., LTD, 26, Grant Street, Birmingham. Analytical chemists and drysalters, manufacturing chemists, etc. Nominal capital, £10,000 in £1 shares.

BOND AND MOFFATT, LTD., 17, Tarleton Street, Liverpool. Chemists and druggists, manufacturers of and dealers in all kinds of salts, acids, alkalis, drugs, etc. Nominal capital, £1,000 in £1 shares.

CATARACT REFINING CO., LTD., Halton House, 20-23, Holborn, London, E.C.1. Manufacturers, refiners of and dealers in oils, petroleum, coal tar, greases, fats, lubricants and all oleaginous substances, etc. Nominal capital, £2,500 in £1 shares.

DR. BERNARD DYER AND PARTNERS, LTD., 17, Great Tower Street, London, E.C.3. Analytical and consulting chemists. Nominal capital, £5,000 in £1 shares (2,000 5 per cent. cumulative preference and 3,000 ordinary).

J. H. AND S. JOHNSON, LTD., 6, Hatton Garden, Liverpool. Manufacturing, wholesale and retail chemists and druggists. Nom. cap., £20,000 in £1 shares (10,000 6 per cent. cumulative preference, 4,000 "A" ordinary, and 6,000 "B" ordinary).

MAGADI SODA CO., LTD.—To acquire lands, mineral deposits and other properties, leases, etc., in the Kenya Colony, Uganda, or elsewhere; to refine and treat natural deposits of soda and other chemicals, to manufacture therefrom or otherwise deal in soda, soda crystals, soda ash, caustic soda, bicarbonate of soda, etc. Experimental and manufacturing chemists; importers, exporters, etc. Nom. cap., £830,000 in 250,000 6 per cent. first preference and 100,000 ordinary shares of £1 each, and 1,320,000 6 per cent. second preference and 600,000 12½ per cent. preferred ordinary shares of 5s. each. Directors: A. Colegate, H. F. Marriott, J. H. Gold, and J. G. Nicholson. Solicitors: Blyth, Dutton, Hartley and Blyth, 112, Gresham House, London, E.C.2.

G. RUDD THOMPSON AND PARTNERS, LTD. Analytical and consulting chemist and analyst. Nominal capital, £10,000 in £1 shares. Solicitor: R. G. Williams, Gloucester Chambers, Newport, Mon.

UNITED OIL AND NATURAL GAS PRODUCTS CORPORATION, LTD. Dealers in carbon black and other natural gas products and merchandise, chemical manufacturers, drysalters, etc. Nominal capital, £10,000 in £1 shares. Solicitors: Simmons and Simmons, 18, Finch Lane, London, E.C.3.

## Chemical Trade Inquiries

*The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.*

CHEMICALS, ETC.—Tenders for the annual supply of the following chemicals are invited by the Municipal Commissioner of Bombay and should be sent to him at the office of the Chief Accountant not later than January 19. The figures following represent the tender deposit in rupees:—Oils, castor and sweet, 250; oil, cocoanut, 200; oil, kerosine, 1,500; pesterine, 400; ammonia and calcium chloride, 100; oils, linseed and turpentine, 200; oils, mineral, 600; oils, mineral (heavy engine), 500; paint varnish, etc., 100; paint, 200.

SULPHATE OF COPPER.—The Commercial Secretary at Bucharest (Mr. R. J. E. Humphreys) reports that the Roumanian State Railways are calling for tenders for the supply of sulphate of copper. United Kingdom firms desiring particulars should apply to the D.O.T.

SCIENTIFIC APPARATUS.—A Boston firm wishes to communicate with U.K. suppliers of scientific apparatus for lecture and laboratory work in teaching physics, chemistry, etc., at schools and colleges. (Reference B.X. 1466.)

### Tariff Changes

CYPRUS.—A law which it is intended to bring into force on January 1, 1925, imposes a uniform Customs duty on petroleum and paraffin imported into Cyprus, at the rate of 4½ cp. for every gallon of oil or part thereof.

GREECE.—An Order cancels the prohibition on the importation of copper and sulphur into Greece.